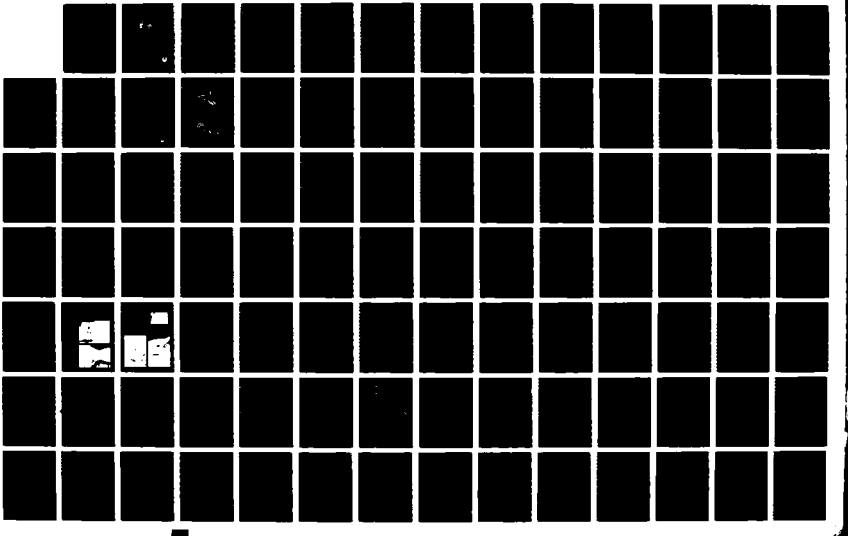
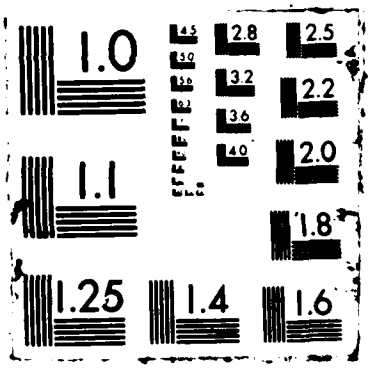
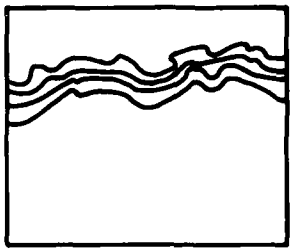
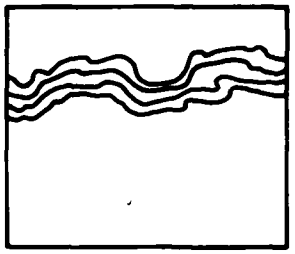
AD-A185 031 ENVIRONMENTAL IMPACT STATEMENT FOR THE NEW SAN CLEMENTE PROJECT MONTEREY..(U) CORPS OF ENGINEERS SAN FRANCISCO CA SAN FRANCISCO DISTRICT SEP 87 1/3

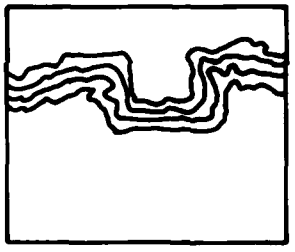
UNCLASSIFIED F/G 13/2 NL




1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0







DRAFT
ENVIRONMENTAL IMPACT
STATEMENT / ENVIRONMENTAL
IMPACT REPORT

NEW SAN CLEMENTE PROJECT

US ARMY CORPS OF ENGINEERS PERMIT APPLICATION NO. 16516 S09

APPENDICES

MONTEREY PENINSULA
WATER MANAGEMENT DISTRICT

SEPTEMBER 1987

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Draft Environmental Impact Report/Environmental Impact Statement For The New San Clemente Project, Monterey County, California - Regulatory Permit Application No. 16516S09 APPENDICES		5. TYPE OF REPORT & PERIOD COVERED Draft 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) EIP Associates San Francisco, California		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer District, San Francisco 211 Main St. San Francisco, CA 94105		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Office of the Chief of Engineers U.S. Department of the Army Washington, D.C. 20314		12. REPORT DATE September 1987 13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

- Prepared in cooperation with the Monterey Peninsula Water Management District

- Appendices are bound in a separate volume

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Environmental impact
Dam
Water supply (M&I)
Carmel River, CA

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Joint State/Federal environmental impact document concerning a regulatory permit application by the Monterey Peninsula Water Management District under Section 404 of the Clean Water Act. The proposed project involves construction of a dam across the Carmel River for the purpose of water supply (M&I), drought protection, and restoration of the environmental quality of the river.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

DRAFT

ENVIRONMENTAL IMPACT STATEMENT/ ENVIRONMENTAL IMPACT REPORT

NEW SAN CLEMENTE PROJECT

ARMY CORPS OF ENGINEERS
PERMIT APPLICATION NO. 16516 S09

APPENDICES

MONTEREY PENINSULA
WATER MANAGEMENT DISTRICT

SEPTEMBER 1987

TABLE OF CONTENTS

APPENDICES

This draft report should be processed by DTIC.
Per Mr. Scott Miner, Army Corps of Engineers, San Francisco District

APPENDIX A

Overview of Carmel Valley Simulation Model

APPENDIX A

OVERVIEW OF CARMEL VALLEY SIMULATION MODEL

Prepared by:

Darby W. Fuerst
Monterey Peninsula Water Management District
Monterey, California

and

Yoram J. Litwin, Ph.D.
RAMLIT Associates
Berkeley, California

September 1987

OVERVIEW OF CARMEL VALLEY SIMULATION MODEL

INTRODUCTION

This appendix presents an overview of the Carmel Valley Simulation Model (CVSIM) and the data, assumptions, and procedures that were used in its development. The descriptions in this appendix are purposely brief. A more detailed description and discussion of CVSIM will be given in District Technical Memorandum 87-01 (in preparation).

The overview of CVSIM is presented in four parts:

I. A general definition of CVSIM, including its purpose, operation, structure, and development.

II. Description of the water resources system of the Monterey Peninsula area, including physical and production aspects.

III. Representation of the system in CVSIM, focusing on the hydrologic inputs and processes.

IV. Description of the water management algorithm, with emphasis on the daily operation of the system.

The overview concludes with a discussion of the accuracy of the model.

The purpse of the overview is to provide sufficient information so that readers can properly evaluate the model-related results presented in the New San Clemente Project Environmental Impact Report/Environmental Impact Statement (EIR/EIS).

I. CVSIM DEFINITION

Simulation refers to the mathematical formulation of a physical system and is used to preview the response of the system to specific plans or actions. The Carmel Valley Simulation Model (CVSIM) is a computer-based simulation model of the water resources system for the Monterey Peninsula area.

Purpose

The model was developed as a planning tool to evaluate various water supply alternatives for the New San Clemente Project EIR/EIS. The model was designed to simulate the performance of the water resources system under varying physical, structural and management conditions. Specifically, CVSIM was tailored to simulate daily processes in the Carmel River basin and provide information relating to streamflow, municipal yield, reservoir operations, and fishery impacts.

In addition, the process of developing CVSIM served to focus the District's research and improve its understanding of the water resources system.

Operation

CVSIM operates on a daily time-step and incorporates both surface and ground-water responses and interactions. CVSIM is a dynamic, accounting model based on the continuity equation. This equation simply means that inflow minus outflow equals the change in storage. Mathematically,

$$I - O = \Delta S$$

Where I = inflow during a given period to a specific area,

O = outflow during a given period from a specific area, and

Δ S = change in volumetric storage during a given period for a specific area

In its current version, CVSIM accounts for inflow, outflow, and storage effects in five aquifer subunits and two to three surface reservoirs, depending on the water supply alternative under investigation.

In addition to simulating the basic hydrologic system, CVSIM also includes options for different structural and operational plans. Sample options include various reservoir sites and sizes, municipal demands, instream flow releases, and rationing parameters. The current and proposed water management algorithms in CVSIM were developed by the District based on extensive computer analyses. The District relied on information provided by the California-American Water Company (Cal-Am), the major

water purveyor in the district. The management algorithms were designed to be compatible with Cal-Am's present and projected production and treatment capacities.

Structure

CVSIM was structured based on a modular concept with the MAIN program the central element. The modular concept was used to facilitate refinements to individual components of CVSIM. In addition to basic input and output specifications, the MAIN program contains the water management algorithm that determines the daily production sequence and calls the various subroutines. These subroutines and brief descriptions of their functions are listed in Table A-1.

The MAIN program consists of four, nested loops. The three outer loops--annual, monthly, and daily--are controlled by specific time-steps. The innermost loop is based on satisfying daily municipal demands and instream flow requirements and allows up to six iterations each day.

Development

CVSIM was developed by District staff with assistance by RAMLIT Associates in 1985-1987. Two daily versions--CVSIM1 and CVSIM2--were developed and installed on the IBM 3033 computer system at the U.S. Naval Postgraduate School in Monterey, California. CVSIM1 was designed to represent New San Clemente Project alternatives and CVSIM2 was developed to simulate existing, No-Project and non San Clemente Project alternatives. Both CVSIM programs were based on earlier monthly (CV3) and daily (SAVEDAY) models developed by the District. The District's original computer model was developed in 1980.

TABLE A-1

CARMEL VALLEY SIMULATION MODEL
SUBROUTINE DESCRIPTION

NAME	FUNCTION
READ	Reads daily, reconstructed Carmel River mainstem and tributary inflows; option to create synthetic sequence of inflow.
RESRVR	Reads area-capacity-elevation values for specified reservoirs, 2) adjusts reservoir capacities for sedimentation and dredging, and 3) computes reservoir elevation and area from capacity
DAM	Operates mainstem dams and calculates resulting releases, diversions, and storage.
TRBDAM	Operates tributary dams and calculates resulting releases, diversions, and storage; option for pumped storage.
EVAPO	Calculates net reservoir evaporation.
FLASH	Operates flashboards at existing San Clemente Dam.
FISHRL	Determines fishery flows required for the Carmel River at the Narrows and the Lagoon.
AQUIFR	Operates Carmel Valley aquifer subunits and calculates riparian evapotranspiration, pumpage, recharge, storage, and outflow.
SEASID	Operates Seaside coastal ground-water basin and calculates pumpage, recharge and outflow.
RATION	Determines reductions in demand required to maintain specified levels of drought reserve.
FREQ	Calculates monthly and annual exceedance frequency values: 10, 20, 40, 50, 60, 80, and 90 percentiles.
STAT	Calculates daily, monthly, and annual statistics; minimum, maximum, mean and sum.
OUTPUT	Prints daily, monthly, and annual values in tabular form.

4 Removed per original 4 Nov 87

H-7 [CA-MNT-1252H].—This is the approximate site of an unlocated cabin dating to about the 1920s. No further work was recommended at this site. The potential location of this site will be reexamined, and if any remains are located a site record will be prepared and a state trinomial applied for.

Analysis and Report Preparation

The results of the above field and archival investigations will be summarized in a final report. This will contain details on the methods used, and the results obtained, during the project. It also will provide an evaluation of the National Register eligibility of each site based on current standards.

METHODOLOGY

Archival Investigation

The research method employed for the current investigation was to conduct intensive archival research based on consultation of primary source material; that is, examination and interpretation of documentation created contemporaneously with the event under study, usually with first hand contact with or general factual knowledge of the event being recorded (U.S. Department of Transportation 1977:VII:29). The current investigation is the third in a series of increasingly specific historical investigations.

Patricia Parker Hickman (Edwards et al. 1974) first provided a broadly-based social and economic history of the area, identifying major historical changes, trends and interactions, and those properties, groups and individuals who contributed to the historical development of the study area. Terri Jacques (WESTEC Services Inc., 1984) identified specific properties to be impacted by the proposed dam construction project, and carried out preliminary archival research based predominantly on examination of secondary source material; that is, documentation created at some distance in time and place from the event being recorded (U.S. Department of Transportation 1977:VII:29). In addition to previously published narrative histories and research reports, the preliminary research phase relied heavily on interviews with current and former employees of the Pebble Beach Company, whose holdings included much of the project area until recent years.

Figure 2

CARMEL RIVER AT SAN CLEMENTE DAM

Reconstructed Annual Flows: 1902 – 1985

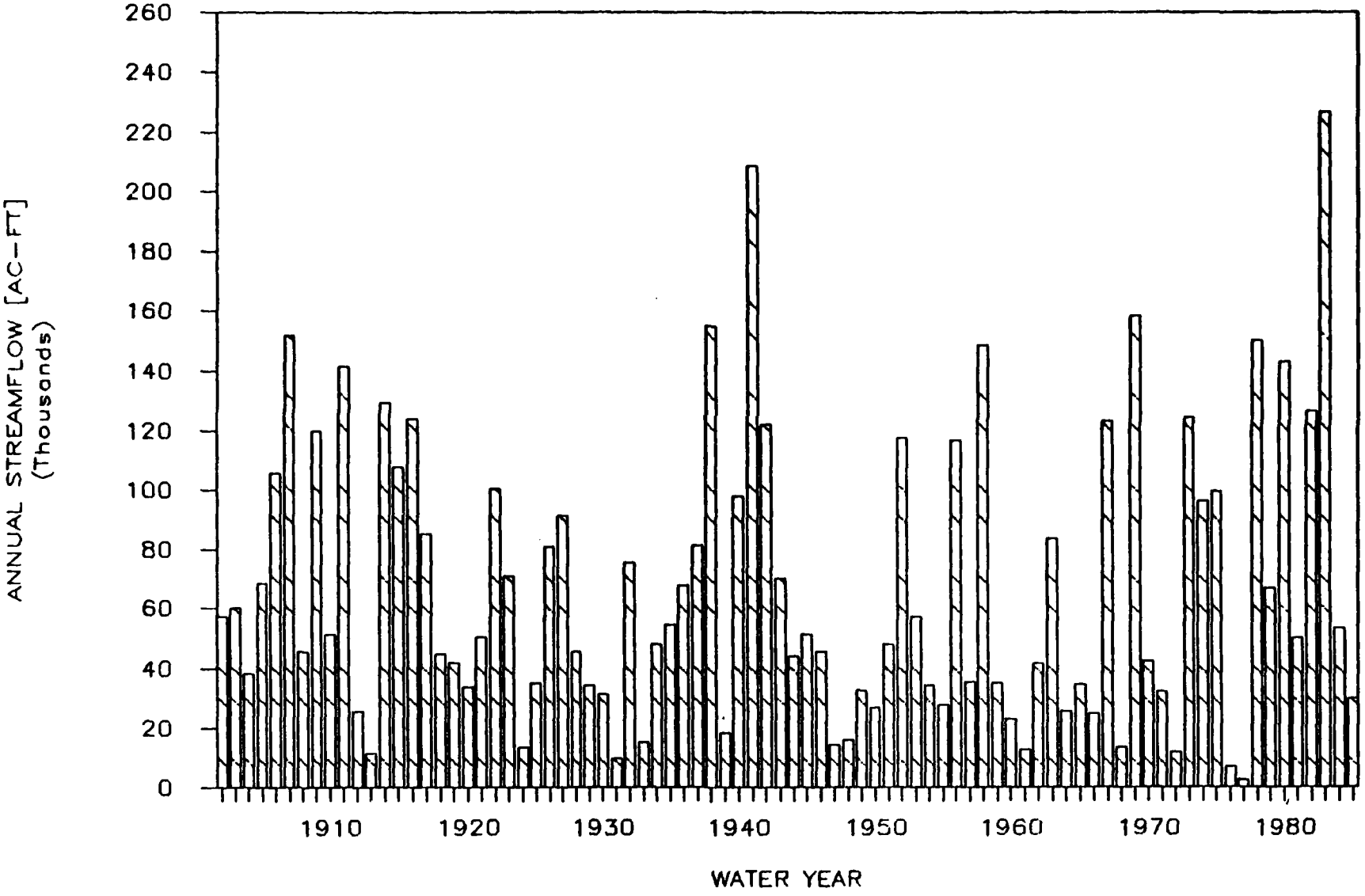


TABLE A-2

CARMEL VALLEY SIMULATION MODEL

RESERVOIR AND AQUIFER UNITS

UNIT	LOCATION	RIVER MILE
CARMEL RIVER RESERVOIRS		
Los Padres	- - - - - - - - -	24.8
San Clemente	- - - - - - - - -	18.5
New San Clemente	- - - - - - - - -	17.8
CARMEL VALLEY AQUIFER		
Subunit 1	San Clemente Dam	18.5
	to the Robles del Rio gage	14.8
Subunit 2	Robles del Rio gage	14.8
	to the Narrows	9.7
Subunit 3	The Narrows	9.7
	to the near Carmel gage	3.6
Subunit 4	Near Carmel gage	3.6
	to the Lagoon	0.0
SEASIDE AQUIFER		
Coastal Subunit	Seaside	

Note: River miles are referenced from mouth.

III. SYSTEM REPRESENTATION

The water resources system for the Monterey Peninsula area is a complex system involving both hydrologic and operational constraints. In order to simulate this system, some simplification was necessary. Figure 3 shows a schematic of the simplified water resources system that was used in CVSIM. The schematic shows the general configuration of the flow system and the relative storage volumes for each reservoir and aquifer subunit. The volumes shown represent usable storage and do not include dead storage or water reserved for minimum pool requirements or as a safeguard against sea-water intrusion. The schematic also shows the location of the major tributaries in the system.

In CVSIM, the Carmel River drainage and Carmel Valley aquifer subunits were represented by a series of six, interconnected reservoirs. Flow and storage values were determined in a downstream order beginning at Los Padres Reservoir and ending at the Carmel River Lagoon. All values were expressed in acre-feet. For each reservoir or aquifer subunit, a water-balance calculation was made. Outflows calculated from upstream units were used as inflows to downstream units. Components for the reservoir and aquifer water balances are illustrated in Figure 4.

In the upper watershed (i.e., above San Clemente Dam), streamflow was simulated at four sites:

1) Inflow to Los Padres Reservoir;

2) Outflow from Los Padres Reservoir;

3) Inflow to San Clemente Reservoir; and

4) Outflow from San Clemente Reservoir.

These flows were based on reconstructed mainstem and tributary inflows, reservoir effects, and diversions. Reservoir effects included controlled releases to the river, spills, evaporation, and leakage. Ground-water flow in the upper watershed is considered negligible and was not included in CVSIM.

In the lower watershed, streamflow was simulated at four additional mainstem sites:

1) Robles del Rio,

2) Scarlett Narrows,

3) Near Carmel, and

4) Carmel River Lagoon.

Figure 3. Schematic of the Water Resources System for the Monterey Peninsula Area

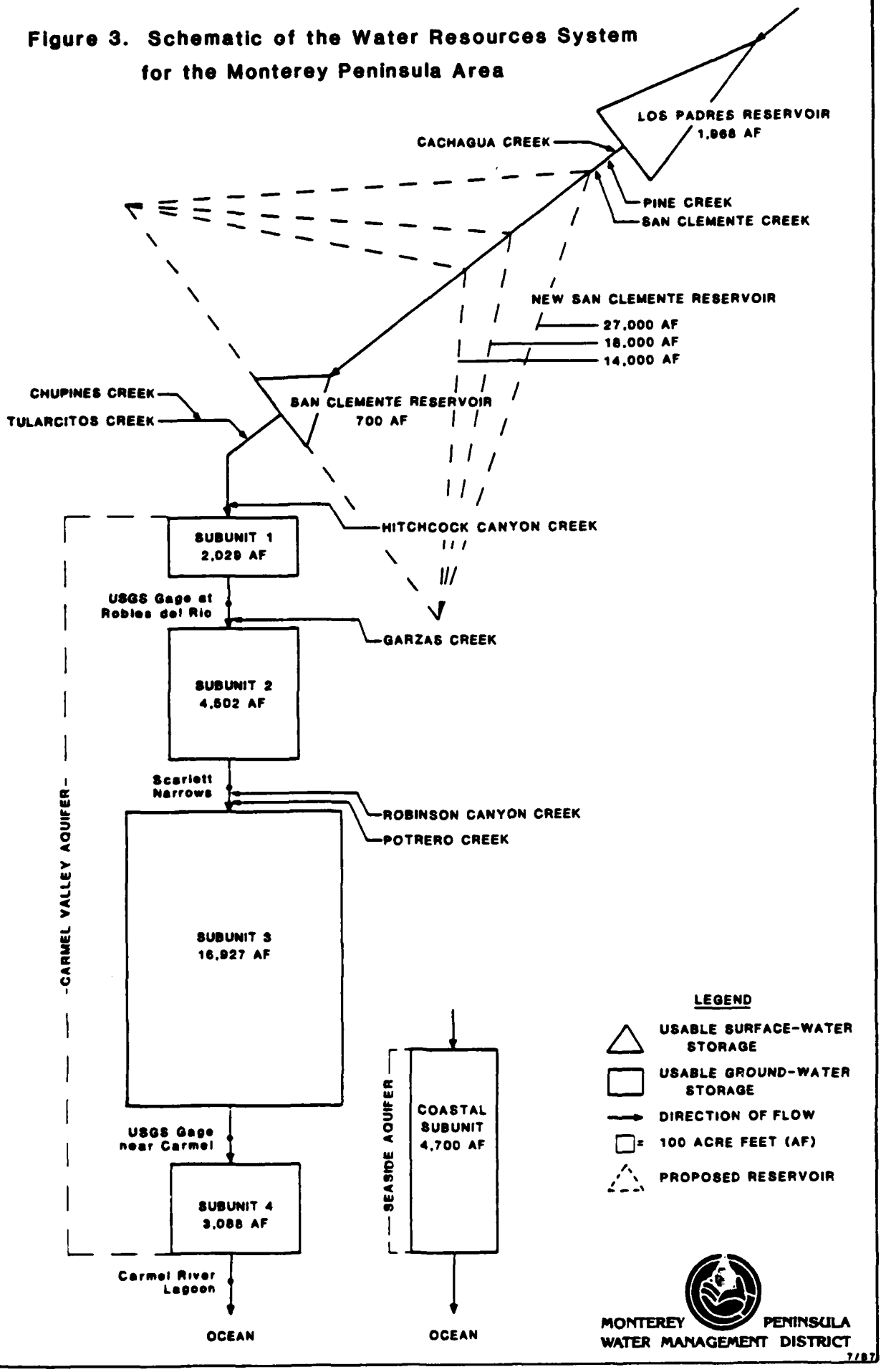
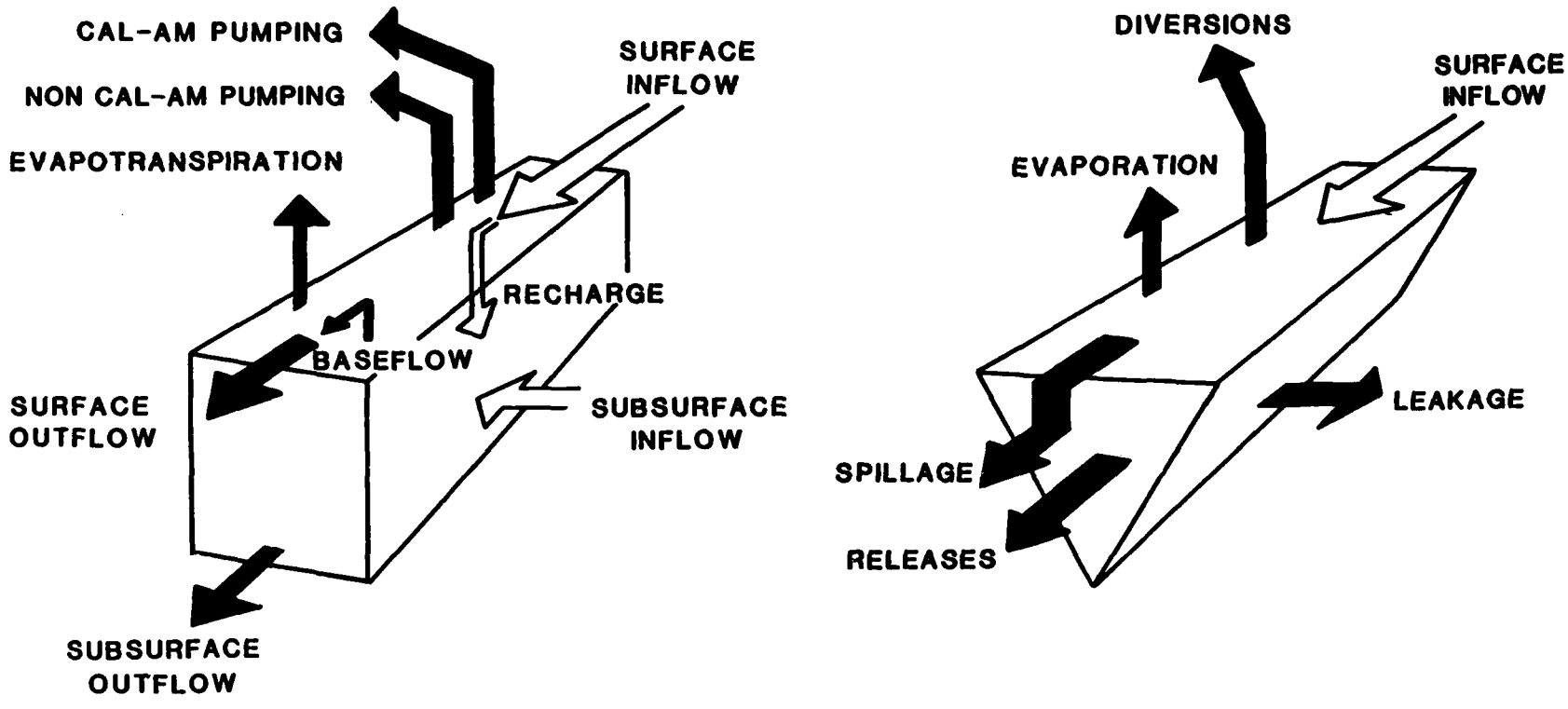


Figure 4. Carmel Valley Simulation Model Accounting Units



These flows were based on upstream mainstem inflow, reconstructed tributary inflows, aquifer effects, and pumpage. Aquifer effects included recharge, subsurface flow, evapotranspiration, and baseflow. Ground-water flow in the lower watershed was estimated from each subunit based on hydraulic conductivity, gradient, and cross-sectional area.

Storage volumes for the reservoir and aquifer units in the Carmel River watershed were calculated based on current storage and simulated inflows and outflows.

Storage and flow values for the Seaside coastal subunit were estimated in a similar, but simplified manner. For this unit, a single value was used to represent net inflow. This value was based primarily on subsurface inflow from the inland subbasins but also included adjustments for recharge from surface sources and losses due to evapotranspiration. No hydrologic connection exists or was assumed between the Seaside subbasin and Carmel River watershed. The units are connected only through the Cal-Am distribution system.

System Parameters

Various parameters were specified in simulating the water resources system for the Monterey Peninsula area. These parameters include estimates of storage, inflows, demand, operational capacities, and hydrologic processes. These parameters, as well as associated distributions, are presented below.

Storage

Refined storage estimates, particularly for the aquifer subunits, were critical in the development and calibration of CVSIM. Earlier estimates of aquifer storage were revised to correspond with specific subunit areas and to reflect operational and water quality constraints. Reservoir storage estimates were updated to reflect recent sedimentation. Table A-3 shows the total, usable, and initial storage values specified in CVSIM. The initial storage estimates were based on mean end-of-year storage values from preliminary simulation runs.

The large difference between total and usable storage in Carmel Valley Subunit 4 and the Seaside Coastal Subbasin is due to concerns regarding sea water intrusion. In the Seaside subbasin, the unusable storage (64,100 acre-feet) is below sea level. In Carmel Valley Subunit 4, 10,763 acre-feet are defined as unusable. Maintenance of this storage provides a positive fresh-water gradient to the ocean and minimizes the potential for sea water intrusion. In addition, most of this storage is not available to the existing Cal-Am production wells.

TABLE A-3

CARMEL VALLEY SIMULATION MODEL

RESERVOIR AND AQUIFER STORAGE ESTIMATES

STORAGE UNIT	TOTAL STORAGE (Acre-Feet)	USABLE STORAGE (Acre-Feet)	INITIAL STORAGE (1) PROJECT (%)	INITIAL STORAGE (1) NO PROJECT (%)
Carmel River Reservoirs				
Los Padres	2,180	1,968	50	80
San Clemente	316-796 (2)	220-700 (2)	—	80
New San Clemente	16,000-29,000 (3)	14,000-27,000 (3)	65	—
Carmel Valley Aquifer				
Subunit 1	2,029	2,029	100	100
Subunit 2	6,099	4,502	100	95
Subunit 3	19,615	16,927	90	80
Subunit 4	13,851	3,088	95	95
Seaside Aquifer				
Coastal Subbasin	68,800	4,700	98	98

(1) Percentage of total storage; based on simulated mean end-of-year values.

(2) With flashboards lowered and raised.

(3) Range of feasible reservoir sizes.

Inflows

Daily flows for the Carmel River at Los Padres Reservoir and nine, selected tributaries were estimated for use as inputs to CVSIM. The estimates were based on the daily flows recorded by the U.S. Geological Survey on the Carmel River at Robles del Rio.

The entire flow record through water year 1985 -- October 1, 1957 to September 30, 1985 -- was used in the estimation procedure. The procedure was developed to estimate daily inflow for the SAVEDAY model. The procedure and associated data were updated and extended for use in CVSIM.

The estimates of daily flow for each tributary were made by correlation with the flow at Robles del Rio. Regression equations for each tributary were developed based on periodic tributary flow measurements made by the District in 1981-1986 and corresponding flows recorded at Robles del Rio. Table A-4 shows the nine tributaries that were selected and includes associated drainage areas and mean annual flows. These tributaries were selected based on their flow and sediment contributions.

The daily flow on the Carmel River at Los Padres Reservoir was estimated by routing the flow at Robles del Rio back through the system. In this routing, the flow at Robles del Rio was reduced to offset tributary inflow, increased to account for diversions at San Clemente Dam, and adjusted for changes in storage (plus or minus) at San Clemente and Los Padres Reservoirs. The final result represents natural, unregulated flow at Los Padres Reservoir and averaged 54,977 acre-feet annually.

Demand

In CVSIM, water demand consisted of municipal supply and instream flow requirements. Municipal use included Cal-Am demand and non Cal-Am demand and was estimated for "Project" and "No-Project" conditions through the year 2020. Non Cal-Am demand included pumpage by small distribution systems and private pumpers and was aggregated by aquifer subunit. Table A-5 shows a breakdown of the demands used in CVSIM for existing "Project" and "No-Project" conditions. The No-Project demand is based on the existing, maximum allocation adopted by the District. The Project demands are based on development planned through the year 2020.

In the simulation, it was assumed that 33% of the non Cal-Am pumpage in Carmel Valley would percolate into the aquifer as return flow. No return flow was assumed for 1) Cal-Am pumpage in Carmel Valley, and 2) All pumpage in Seaside.

The demands shown in Table A-5 represented normal-year use and were increased for dry conditions. The increases in demand were made each month based on river flow conditions with a 7.5% annual maximum. Table A-6 shows the monthly distribution used to increase municipal demand and also lists the percentages used to distribute the annual Cal-Am and non Cal-Am demands. Mean daily

TABLE A-4

CARMEL VALLEY SIMULATION MODEL

SELECTED CARMEL RIVER TRIBUTARIES

TRIBUTARY	DRAINAGE AREA (Square Miles)	SIMULATED MEAN ANNUAL FLOW (1) (Acre-Feet)
Cachagua Creek	46.3	4,338
Pine Creek	7.8	4,039 (2)
San Clemente Creek	15.6	8,078
Tularcitos Creek	40.5	3,721 (3)
Chupines Creek	15.8	1,463 (4)
Hitchcock Canyon Creek	4.6	1,043
Garzas Creek	13.2	6,301
Robinson Canyon Creek	5.4	1,552
Potrero Creek	5.2	903

(1) Based on 1958-1985 period.

(2) Estimate based on area-yield relationship with San Clemente Creek.

(3) Adjusted for flow from Chupines Creek.

(4) Estimate based on area-yield relationship with Tularcitos Creek.

TABLE A-5

CARMEL VALLEY SIMULATION MODEL

ESTIMATED MUNICIPAL WATER DEMAND

USER/SOURCE	NORMAL-YEAR DEMAND: ACRE-FEET		
	EXISTING CONDITIONS (1987)	NO-PROJECT CONDITIONS (2020)	PROJECT CONDITIONS (2020)
CAL-AM			
System-wide	18,000	20,000	22,895
NON CAL-AM			
Carmel Valley Aquifer Subunit 1	130	139	139
Carmel Valley Aquifer Subunit 2	331	340	340
Carmel Valley Aquifer Subunit 3	676	697	697
Carmel Valley Aquifer Subunit 4	793	796	796
Seaside Coastal Aquifer Subbasin	825	850	850
TOTAL	20,755	22,822	25,717

TABLE A-6

CARMEL VALLEY SIMULATION MODEL

DEMAND-RELATED MONTHLY DISTRIBUTIONS

MONTH	PERCENTAGE OF ANNUAL CAL-AM DEMAND (1) (%)	PERCENTAGE OF ANNUAL NON CAL-AM (2) DEMAND (%)	PERCENTAGE INCREASE OF NORMAL-YEAR (3) DEMAND (%)
OCTOBER	8	7	6
NOVEMBER	6	2	7
DECEMBER	6	2	7
JANUARY	7	2	7
FEBRUARY	6	2	8
MARCH	7	4	15
APRIL	7	9	20
MAY	10	13	8
JUNE	11	16	7
JULY	11	15	7
AUGUST	11	15	2
SEPTEMBER	10	13	2

(1) Based on median monthly values for 1967-1983.

(2) Based on District well reporting program data for 1984-1985.

(3) Applied during dry and critically dry months, i.e., lower quartile flow at San Clemente Dam.

demands were estimated by dividing the monthly demands by the number of days in each respective month.

Instream flow releases for the steelhead fishery on the Carmel River were included in both "Project" and "No-Project" simulations. For No-Project conditions, the fishery flow releases were based on procedures specified in a Memorandum of Understanding between Cal-Am, the California Department of Fish and Game, and the District. In CVSIM2, a minimum, year-round release of three cubic feet per second (cfs) was specified at San Clemente Dam. This release was equivalent to an annual requirement of 2,171 acre-feet.

For New San Clemente Project conditions, the fishery flow releases were based on a flow schedule recommended by D.W. Kelley and Associates (DWK). The schedule was developed to satisfy the needs of the steelhead during each phase of their life cycle and varied according to water supply conditions. Requirements were specified at two sites below the dam: the Narrows and the Carmel River Lagoon. A constant flow of 20 cfs was specified at the Narrows and was equivalent to an annual requirement of 14,476 acre-feet. This water was available for recharge to the lower subunits in the Carmel Valley aquifer.

The flows that were specified at the Lagoon varied daily depending on runoff and storage conditions. Table A-7 shows the proposed flow schedule and includes a breakdown by water year type, month, and purpose. The annual requirement at the Lagoon can range from 3,014 acre-feet, under critically-dry conditions, to 24,308 acre-feet under normal or wet conditions. This water would not be available for recharge.

To simulate the proposed fishery flow releases, operating rules were developed jointly by the District and DWK. These rules are complicated and involve a number of factors including:

1) Water year classification,

2) New San Clemente Reservoir storage,

3) Daily inflows at Los Padres Reservoir, and

4) Daily flow at the Lagoon

Water Year Classification. In the process of developing the proposed flow schedule, DWK defined four water year types based on selected, non-exceedance flow frequencies. Table A-8 shows each type and selected non-exceedance frequency and value for the reconstructed annual flows at San Clemente.

In order to classify inflow conditions during the water year, the selected frequencies values were determined for the cumulative monthly flows. These cumulative values are shown in Table A-9

TABLE A-7

PROPOSED STEELHEAD FISHERY FLOW SCHEDULE FOR NEW SAN CLEMENTE PROJECT

JAN	FEB	MAR	APR	MAY	JUN - DEC
NORMAL OR BETTER WATER YEARS					
Adult migration and spawning:			Smolt emigration:		Juvenile rearing:
A. Maintain 5 cfs to Lagoon until attraction event (storm)			40 cfs to Lagoon for	40 cfs to Lagoon for	20 cfs to Narrows for
B. Attraction event triggers release of 200 cfs to Lagoon for			30 days	31 days	214 days and 5 cfs to Lagoon for
	2 days	4-7 days	4-7 days		
C. After attraction release, maintain 75 cfs to Lagoon until next attraction event or through March 31, if no more attraction events occur					214 days
BELOW NORMAL YEARS (1)					
Adult migration and spawning:			Smolt emigration:		Juvenile rearing:
A. Maintain 5 cfs to Lagoon until attraction event; if no attraction event by March 1, release 40 cfs to Lagoon all days in March			40 cfs to Lagoon for	30 cfs to Lagoon for	20 cfs to Narrows for
			30 days	31 days	214 days, and 5 cfs to Lagoon for
B. Attraction event triggers release of 200 cfs to Lagoon for					214 days
	0 days	5 days	5 days		
C. After attraction release, maintain 75 cfs to Lagoon until next attraction event or through March 31, if no more attraction events occur					

TABLE A-7 (CONT.)

PROPOSED STEELHEAD FISHERY FLOW SCHEDULE FOR NEW SAN CLEMENTE PROJECT

JAN	FEB	MAR	APR	MAY	JUN - DEC
DRY YEARS (1)					
Adult migration and spawning:			Smolt emigration:		Juvenile rearing:
A. Maintain 5 cfs to Lagoon until attraction event; if no attraction event by March 1, release 40 cfs to Lagoon all days in March			40 cfs to Lagoon for 30 days	30 cfs to Lagoon for 31 days	20 cfs to Narrows for 214 days, and 0 cfs to Lagoon
B. Attraction event triggers release of 200 cfs to Lagoon for	0 days	0 days 5 days			
C. After attraction release, maintain 75 cfs to Lagoon until next attraction event or through March 31, if no more attraction events occur					
CRITICAL YEARS (1)					
Adult migration and spawning:			Smolt emigration:		Juvenile rearing:
A. No attraction requirement			30 cfs to Lagoon for 30 days	20 cfs to Lagoon for 31 days	20 cfs to Narrows for 214 days, and 0 cfs to Lagoon

(1) If total reservoir storage exceeds 15,000 acre-feet, the "normal or better year" release schedule is in effect regardless of the actual water year type.

and were used to indicate natural inflow conditions **to date.** The cumulative values were, in turn, used as the basis for estimating the inflow expected through the remainder of the water year. Given the cumulative flow to date, estimates of the minimum flow expected for the remainder of the water year were made for each water year type. The estimates of expected inflow were specified at the 25% risk level. The expected inflows are shown in Table A-10 and were used in conjunction with the cumulative inflows to predict water year type for the entire year. The various levels of fishery flow releases were made based on this prediction of water year type. In the simulations, this prediction was updated at the beginning of each month.

Daily Inflows at Los Padres Reservoir. The timing of steelhead attraction releases during the January - March season was based on daily flow increases at Los Padres Reservoir. Specific sequences of 4-day and 3-day flow events were used to determine the appropriate release. The sequences were developed by DWK based on observed fishery response and were designed to mimic natural attraction events as closely as possible. In the simulations, the sequences were characterized by specific levels of increasing flow for each attraction month and were assessed daily. The duration of the releases depended on when the releases occurred within each month.

New San Clemente Reservoir Storage. The operating rules were designed to utilize storage in New San Clemente Reservoir for two purposes. The first purpose was to regulate flow so that the releases proposed for various water year types were maintained. The second purpose was to augment flow so that proposed releases could be increased whenever sufficient storage was available at New San Clemente Reservoir. Specifically, whenever total reservoir storage exceeded 15,000 acre-feet, "normal or better" year releases were made regardless of actual water year classification.

Daily Flow at the Lagoon. The operating rules also accounted for inadvertent attraction flows at the Lagoon. If attraction releases occurred at the Lagoon due to reservoir spill or downstream tributary inflows, releases were continued to maintain the attraction and migration event. In CVSIM1, if the flow at the Lagoon on the previous day exceeded 190 cfs, releases were made to maintain the attraction and migration requirements.

Operational Capacities

Operational capacities for the Cal-Am system and non Cal-Am users were specified in CVSIM. For the Cal-Am system, the capacities included surface-water diversion, ground-water pumpage, and water treatment facilities. Maximum, daily pumping capacities for Cal-Am wells were aggregated by aquifer subunit and decreased by 13% for system-wide depreciation.

TABLE A-8

CARMEL VALLEY SIMULATION MODEL

WATER YEAR CLASSIFICATION

WATER YEAR TYPE	CARMEL RIVER AT SAN CLEMENTE DAM(1)	
	NON-EXCEEDANCE FLOW FREQUENCY(2) (%)	NON-EXCEEDANCE FLOW VALUE (Acre Feet)
NORMAL OR BETTER	> 50	> 48,100
BELOW NORMAL	50 - 25	48,100 - 31,750
DRY	25 - 12.5	31,750 - 14,925
CRITICALLY DRY	< 12.5	< 14,925

(1) Based on reconstructed, unimpaired flow at San Clemente Dam: 1902-1978.

(2) Frequencies derived by D.W. Kelley and Associates. Originally applied to Carmel River flow at Robles del Rio (D.H. Dettman, personal communication).

TABLE A-9

CARMEL VALLEY SIMULATION MODEL

CUMULATIVE INFLOWS AT NEW SAN CLEMENTE SITE (ACRE-FEET)

Period	WATER SUPPLY CLASS			
	"Normal or Better"	"Below Normal"	"Dry"	"Critically Dry"
	(1)	(2)	(3)	(4)
End of October	> 200	200 - 100	100 - 1	0
Oct - November	> 1,000	1,000 - 500	500 - 200	< 200
Oct - December	> 4,100	4,100 - 1,700	1,700 - 1,175	< 1,175
Oct - January	> 11,800	11,800 - 5,450	5,450 - 4,100	< 4,100
Oct - February	> 26,300	26,300 - 14,400	14,400 - 7,550	< 7,550
Oct - March	> 39,100	39,100 - 21,950	21,950 - 10,925	< 10,925
Oct - April	> 46,400	46,400 - 28,300	28,300 - 12,975	< 12,975
Oct - May	> 47,400	47,400 - 30,650	30,650 - 14,425	< 14,425
Oct - June	> 48,000	48,000 - 31,550	31,550 - 14,900	< 14,900
Oct - July	> 48,100	48,100 - 31,700	31,700 - 14,925	< 14,925
Oct - August	> 48,100	48,100 - 31,750	31,750 - 14,925	< 14,925

NOTE: Classes derived from monthly unimpaired flows to San Clemente Dam for the period 1902-1978. The unimpaired flows were estimated by the U.S. Army Corps of Engineers (1981).

TABLE A-10

CARMEL VALLEY SIMULATION MODEL

EXPECTED INFLOWS AT NEW SAN CLEMENTE SITE WITH 25% RISK (ACRE-FEET)

Period	WATER SUPPLY CLASS			
	"Normal or Better" (1)	"Below Normal" (2)	"Dry" (3)	"Critically Dry" (4)
November - September	48,100 1)	45,975	30,450	23,200
December - September	32,700	30,400	26,400	14,250
January - September	27,400	20,975	15,600	9,700
February - September	25,000	17,300	9,100	7,225
March - September	22,850	10,500	5,300	3,050
April - September	12,700	5,700	3,050	1,350
May - September	5,200	2,525	1,600	500
June - September	2,000	825	750	100
July - September	675	150	75	0
August - September	200	0	0	0
September	0	0	0	0

1) Annual median value.

For non Cal-Am users, the operational capacities were limited to ground-water production. Maximum daily pumping capacity for each aquifer subunit was estimated based on reported peak monthly pumpage.

Table A-11 shows the existing operational capacities for the Cal-Am system and non Cal-Am users. For New San Clemente Project conditions, the treatment capacity at the Begonia Iron Removal Plant was increased to 54.0 acre-feet/day and pumping capacities in Carmel Valley aquifer subunit 2 and Seaside coastal aquifer were increased to 14.76 and 19.01 acre-feet/day, respectively. Similar increases were assumed for the No-Project conditions, with the exception of the 5.38 acre-feet/day increase in Carmel Valley aquifer Subunit 2.

Reduced Pumping Capacity. In CVSIM, it was also assumed that ground-water pumping capacity would decrease as ground-water levels declined. Specific functions relating pumping capacity to ground-water storage in each aquifer subunit were developed. The functions were used to determine the percentage of maximum pumping capacity for the Cal-Am wells that would be available at various storage levels. Table A-12 shows the equations developed for each aquifer subunit. Pumping capacity goes to zero when water levels drop below the perforations of the Cal-Am wells.

Hydrologic Processes

In developing the water balance equations for the surface and subsurface reservoirs in CVSIM, a number of hydrologic processes were specified. These processes included:

1) Aquifer recharge,

2) Baseflow,

3) Subsurface flow,

4) Riparian evapotranspiration, and

5) Reservoir evaporation and leakage.

Each of these processes is described below.

Aquifer recharge. In CVSIM, it was assumed that all aquifer recharge in the Carmel Valley occurred via infiltration through the bed of the Carmel River. Tributary flows were added to the mainstem flow before estimating recharge. The recharge functions used in CVSIM were based on a set of monthly percolation-runoff-drawdown curves developed by the U.S. Corps of Engineers for the Carmel River. These curves were modified to provide daily recharge estimates in CVSIM. Based on three drawdown ranges--0-1,000, 1,000-3,000, and greater than 3,000 acre-feet--different equations were used to estimate the percentage of specified

TABLE A-11

CARMEL VALLEY SIMULATION MODEL

EXISTING OPERATIONAL CONSTRAINTS

FACILITY	OPERATIONAL CAPACITY: ACRE-FEET/DAY CAL-AM SYSTEM	 NON CAL-AM USERS
Carmel Valley Filter Plant (1)	32.00	----
Begonia Iron Removal Plant (2)	48.00	----
<u>Carmel Valley Aquifer</u>		
Subunit 1 Wells	2.61	0.80
Subunit 2 Wells	9.38	2.03
Subunit 3 Wells	57.20	4.14
Subunit 4 Wells	7.69	4.86
<u>Seaside Aquifer</u>		
Coastal Wells	16.70	2.63

(1) Also represents surface-water diversion capacity from San Clemente Dam.

(2) Treatment is required for all production wells in Carmel Valley aquifer subunits 3 and 4 except for Scarlett Wells #4 and #7 (7.61 acre-feet/day).

TABLE A-12

CARMEL VALLEY SIMULATION MODEL

REDUCED GROUND-WATER PUMPING CAPACITIES

AQUIFER SUBUNIT	EQUATION RELATING CAL-AM PUMPING CAPACITY TO GROUND-WATER STORAGE (1)
Carmel Valley Aquifer	
Subunit 1	$y = 0.97\ (x)^{0.34}$
Subunit 2	$y = 1.03\ (x)^{0.32}$; if $x > 0.46$
	$y = 2.68\ (x) - 0.58$; if $x < 0.46$
	$y = 0$; if $x < 0.26$
Subunit 3	$y = 1.02 + 0.45\ (x)$
	$y = 0$; if $x < 0.14$
Subunit 4	$y = 1.01 + 0.44\ (\ln x)$
	$y = 0$; if $x < 0.78$
Seaside Aquifer	
Coastal Subbasin	$y = 0.80 + 0.20\ (x)$

(1) Where:

x = percentage of total ground-water storage available.
y = percentage of Cal-Am pumping capacity available.

streamflow that would percolate into the aquifer. Recharge increased with increased streamflow and decreased with increased water levels. The recharge functions were applied to each aquifer subunit and uniform drawdown within each subunit was assumed.

Recharge from surface sources in the Seaside coastal subbasin is minor and was included in the estimate for net subsurface inflow.

Baseflow. In the simulation, baseflow occurred whenever aquifer subunit storage capacity was exceeded. At these times, the excess water was added to the surface outflow. Baseflow was not calculated for the Seaside coastal subbasin.

Subsurface flow. Estimates of the subsurface flow rates between the Carmel Valley aquifer subunits were initially developed as equations based on Darcy's law. During calibration of CVSIM, these rates were adjusted and expressed as constants. A flow rate of 7.62 acre-feet/day was specified into and out of Subunits 1 and 2. In the lower valley, 7.62 acre-feet/day were specified as inflow to Subunit 3 and 2.43 acre-feet/day as outflow. In Subunit 4, 2.43 acre-feet/day was specified as inflow and 0.95 acre-feet/day as outflow to the ocean.

Subsurface inflow to the Seaside coastal subbasin was specified as 3,950 acre-feet annually. This inflow was distributed uniformly during the year. The estimate was based on a comparison of basin water level response to varying ground-water extraction and recharge conditions. Subsurface outflow was specified as 500 acre-feet/year.

Riparian evapotranspiration. Evapotranspiration losses for the riparian vegetation along the Carmel River were specified as 600 acre-feet/year. This estimate was based on a riparian area of 160 acres extending 18.5 miles from San Clemente Dam to the Carmel River Lagoon. Evapotranspiration losses were calculated for each aquifer subunit and were not adjusted for dry conditions. Table A-13 shows the monthly distribution that was specified for riparian evapotranspiration in CVSIM.

Reservoir evaporation and leakage. Reservoir evaporation was calculated as the product of reservoir surface area and monthly net evaporation rate. The monthly net evaporation rates are shown in Table A-13 and were derived by the U.S. Army Corps of Engineers for Los Padres Reservoir. Negative, net evaporation occurs when precipitation exceeds evaporation. In CVSIM, gross evaporation rates were used during dry and critically dry periods. Annual net evaporation was 2.56 feet/acre for Los Padres and San Clemente Reservoirs.

Reservoir leakage for the existing and proposed San Clemente Dams was estimated as 2.0 acre-feet/day. No leakage was estimated for Los Padres Reservoir.

TABLE A-13

CARMEL VALLEY SIMULATION MODEL

MONTHLY EVAPORATION RATES

MONTH	NET RESERVOIR EVAPORATION RATE (Feet/Acre)	RIPARIAN VEGETATION EVAPOTRANSPIRATION (Acre-Feet)
October	0.247	42
November	-0.001	24
December	-0.230	18
January	-0.286	24
February	-0.185	30
March	0.030	42
April	0.238	60
May	0.612	84
June	0.612	72
July	0.645	78
August	0.563	66
September	0.419	60
Total	2.560	600

IV. CVSIM MANAGEMENT AND OPERATIONS

Water management algorithms were developed for the Project and No-Project conditions. The algorithms focused on operation of the Cal-Am system and were designed to meet the water supply goals of the District. The Project and No-Project algorithms were similar but differed mainly in the volume of municipal water and fishery flow requirements that were supplied. Each algorithm utilized conjunctive-use management to maximize the benefits from the surface and ground-water resources.

The algorithms were designed to reflect District policy and to be consistent with present and projected Cal-Am production facilities. All water management decisions were structured in a real-time context and were based on a comparison between system supply and demand. Both short-term (daily) and long-term (seasonal and annual) comparisons were considered in the water management algorithms.

In general, water management decisions were made within the water year--October through September--at the beginning of each month. Specific water production sequences and fishery flow releases were determined daily.

The decisions were made in a downstream, sequential order. The management sequence began with the Seaside coastal subbasin and then moved through the Carmel River system (Figure 3). The decision process was complicated by two factors: 1) the extreme seasonal and annual flow variability, and 2) the dynamic nature of the system. The uncertainty regarding future inflow made it difficult to reliably plan reservoir releases. The complex stream-aquifer-pumping interaction in the Carmel Valley also made it difficult to maintain flow requirements and meet municipal demands. These difficulties were overcome by including a recursive routine in the daily operations and running numerous trial simulations.

The water management algorithms can be divided into two elements:

1) Monthly management decisions, and

2) Daily operations.

Each of these elements are described below, with special emphasis on the daily operations.

Monthly Water Management

Current and expected water supply conditions were assessed monthly in CVSIM. Current conditions were represented by:

1) All usable surface and subsurface reservoir storage, and

2) All unimpaired inflow to San Clemente Dam to date.

The cumulative inflow at San Clemente was compared with selected non-exceedance flow values (Table A-9) to classify flow conditions. This index was termed CUMFLO and consisted of four classes, with "1" representing "normal or better".

CUMFLO was used to determine:

1) the dry-year adjustment to municipal demand,

2) the diversion to the filter plant under Project conditions,

3) the effective reservoir evaporation rate, and

4) the expected inflow for the remainder of the water year.

Expected water supply conditions were represented by:

1) the inflow expected at San Clemente for the remainder of the water year, and

2) the sum of the inflow to date (CUMFLO) and the expected inflow for the remainder of the water year.

The estimates for expected inflow were based on the flow to date and were provided at the 25% risk level (Table A-10). This means that, given the current inflow, the expected inflow will equal or exceed the indicated value three out of four times. The expected inflow was termed EXPINF.

CUMFLO and EXPINF were summed and compared to the selected, annual frequency values to predict the eventual water year class. This predicted water year type was termed STATUS and was used to determine fishery flow releases. STATUS was ordered like CUMFLO, with "1" equivalent to "normal or better".

Filter Plant Diversions

Diversions to the Carmel Valley filter plant from the New San Clemente Project were determined monthly based on reservoir storage and cumulative inflow conditions. Storage, in excess of fishery flow requirement for the current and following month, was calculated and allocated for diversion. The maximum diversion (32 acre-feet/day) was reduced by 65% in below normal years and set at the minimum (6 acre-feet/day) under dry and critically dry

conditions. For existing and No-Project conditions, annual diversion to the filter plant was specified as 35% of Cal-Am annual demand and was distributed monthly based on a schedule developed by Cal-Am.

Rationing

Rationing requirements were determined monthly based on a comparison of expected system demand and supply. If needed, reductions in demand were specified to forestall and lessen the impacts from severe or sustained drought. The reductions used in CVSIM are shown in Table A-14 and were applied to Cal-Am and non Cal-Am users.

The rationing procedure was designed to maintain selected levels of drought reserve. If the expected system supply fell below the expected demand, rationing was initiated. Three levels of drought reserve were specified and included in the expected system demand. The reserves were expressed as percentages--90%, 40%, 0%--of Cal-Am dry-year demand.

Daily Operations

The daily operations plan was developed principally for the Cal-Am system and consisted of a series of decisions related to the timing and magnitude of reservoir releases and diversions and ground-water pumpage. The plan was designed to:

1) Satisfy and, when possible, augment the proposed steelhead flow requirements, and

2) Satisfy Cal-Am and non Cal-Am demands as frequently as possible, and

3) Maintain system equipment and efficiency.

The daily operations involved an 11-step procedure. The last step in the process was a test to see if the municipal supply and fishery flow requirements had been met. If not satisfied, the procedure was repeated up to six times to correct for the shortages. Each of the steps in the operations procedure for the New San Clemente Project is described below.

1. Pump Seaside coastal subbasin. Cal-Am's initial pumpage is based on an annual production target of 2,500 acre-feet. This value is divided among the months using Cal-Am demand distribution (Table A-6). If a shortage occurs in the Cal-Am system, Seaside production is increased to offset or reduce the deficit.

2. Determine the fishery flow releases at the Narrows and Lagoon.

TABLE A-14

CARMEL VALLEY SIMULATION MODEL

MUNICIPAL DEMAND REDUCTION DUE TO RATIONING

POLICY	DEMAND REDUCTION (%)
No Rationing	0
Voluntary Rationing	10
Mandatory Outdoor Restrictions	25
Mandatory Outdoor and Indoor Restrictions	40

3. Select the controlling fishery flow release. The controlling release is the greater of the two requirements and includes associated conveyance losses. For example, a 5 cfs requirement at the Lagoon that requires a 40 cfs release at the dam is greater than a 20 cfs requirement at the Narrows that requires a 25 cfs release at the dam. Therefore, the 5 cfs requirement is the control and a release of 40 cfs is specified at the dam. The conveyance loss is treated as a fishery flow shortage and is determined by trial and error through the iterations.

4. Increase filter plant diversion to maximum capacity if New San Clemente Reservoir storage exceeds 15,000 acre-feet. This increase overrides the monthly determination and is included to account for large stormflows within a month.

5. Operate Los Padres Reservoir. No diversions are made at Los Padres Reservoir and a constant 5 cfs instream flow release is initially specified. If shortages occur, releases are increased to offset diversions from New San Clemente Reservoir.

6. Operate New San Clemente Reservoir. Make filter plant diversions and river releases based on earlier determinations.

7. Pump Carmel Valley Aquifer Subunit 1. If total storage in Subunit 2 is less than 4,380 acre-feet (approximately 15 feet drawdown), maximize pumping. If storage is greater, limit pumping to maintenance level. The maintenance level was defined as pumping at half capacity for one day each week.

8. Pump Carmel Valley Aquifer Subunit 2. If total storage in Subunit 3 is less than 10,730 acre-feet (approximately 40 feet drawdown) or total storage in New San Clemente Reservoir is less than 10,000 acre-feet, maximize pumping. If both storages are greater, limit pumping to maintenance level.

9. Pump Carmel Valley Aquifer Subunit 3. Calculate remaining Cal-Am demand and distribute demand between Subunits 3 and 4. Subunit 3 is assigned 85% of the remaining demand based on relative pumping capacities. Total pumping from Subunit 3 and 4 is compared with the maximum capacity at the Begonia treatment plant and reduced, if necessary.

10. Pump Carmel Valley Aquifer Subunit 4. Pump specified demand.

11. Determine shortages for Cal-Am system or fishery flow requirements. If shortages occur, add shortage increment to respective requirement and repeat procedure. Maximum number of iterations is currently six.

It should be noted that after each production source was operated, the remaining Cal-Am demand was calculated and a test for over-production was made. If yield exceeded demand, then the last source was reduced accordingly and production from the remaining sources was bypassed.

V. CVSIM ACCURACY

CVSIM was calibrated using two flow periods: 1976-1978 and 1984-1985. The 1976-1978 period was chosen because it represents the critical dry period and includes an above-normal year. The 1984-1985 period was used because it represents a below-normal period and includes pumpage from Cal-Am's four new wells in the lower Carmel Valley subunits. In the calibration, emphasis was placed on the 1976-1978 period. This is the Project design period and, from a water management perspective, accuracy during this period was considered foremost. Observed data were available at two mainstem flow sites--Robles del Rio and near Carmel--and four reservoirs--Los Padres, San Clemente, Carmel Valley Subunit 3, and Carmel Valley Subunit 4. Graphs comparing the observed and simulated values for streamflow near Carmel and storage in Carmel Valley Aquifer Subunit 3 are presented in Figure 5 and 6, respectively.

In general, the results indicated good agreement between the recorded and simulated values, especially for ground-water storage.

Other checks on model accuracy included:

1) Detailed review of the computer codes by District staff and RAMLIT Associates,

2) Automatic daily water balance calculations for each reservoir and aquifer unit, and

3) Optional monthly and annual water balance calculations for the total system.

Figure 5

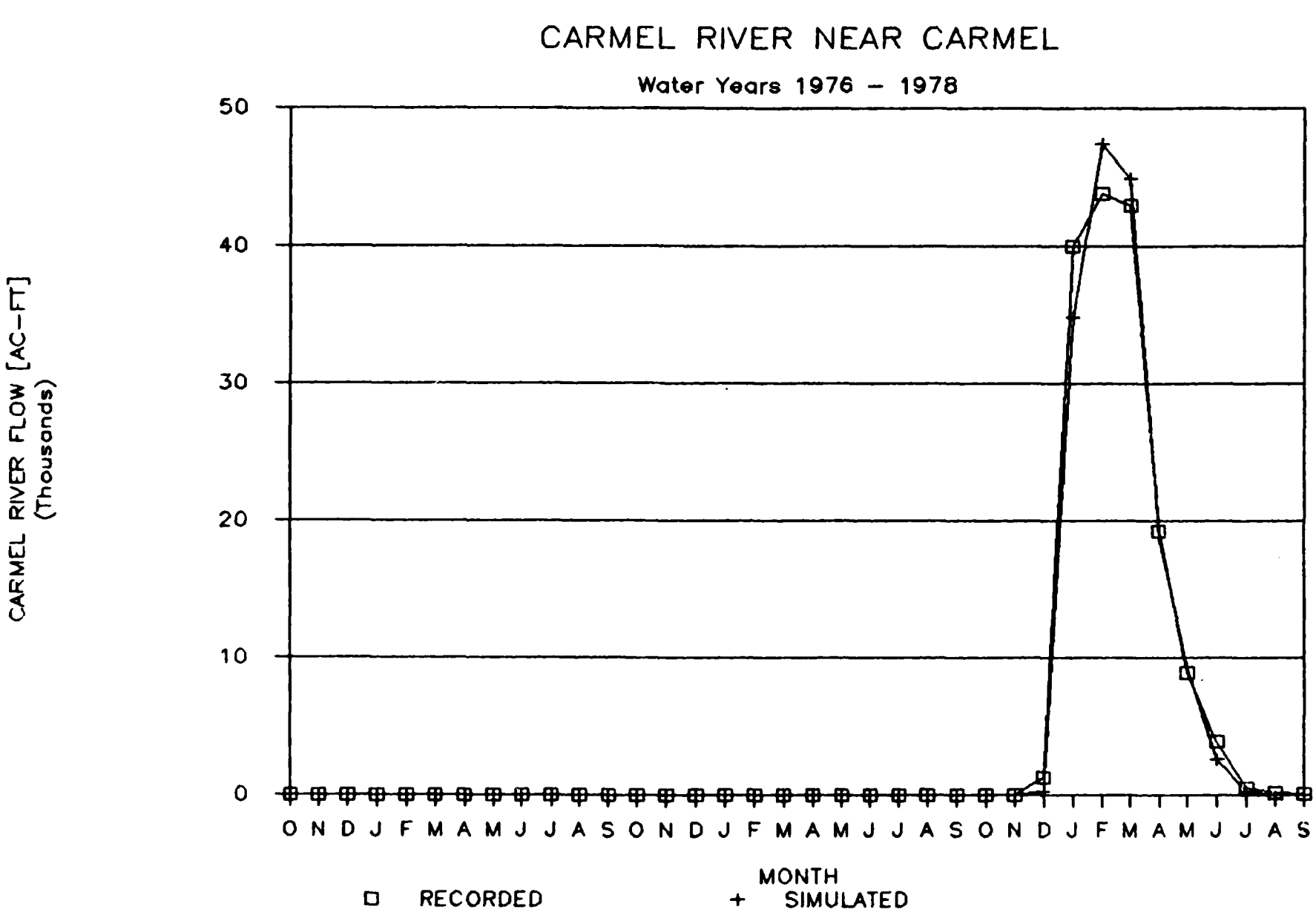
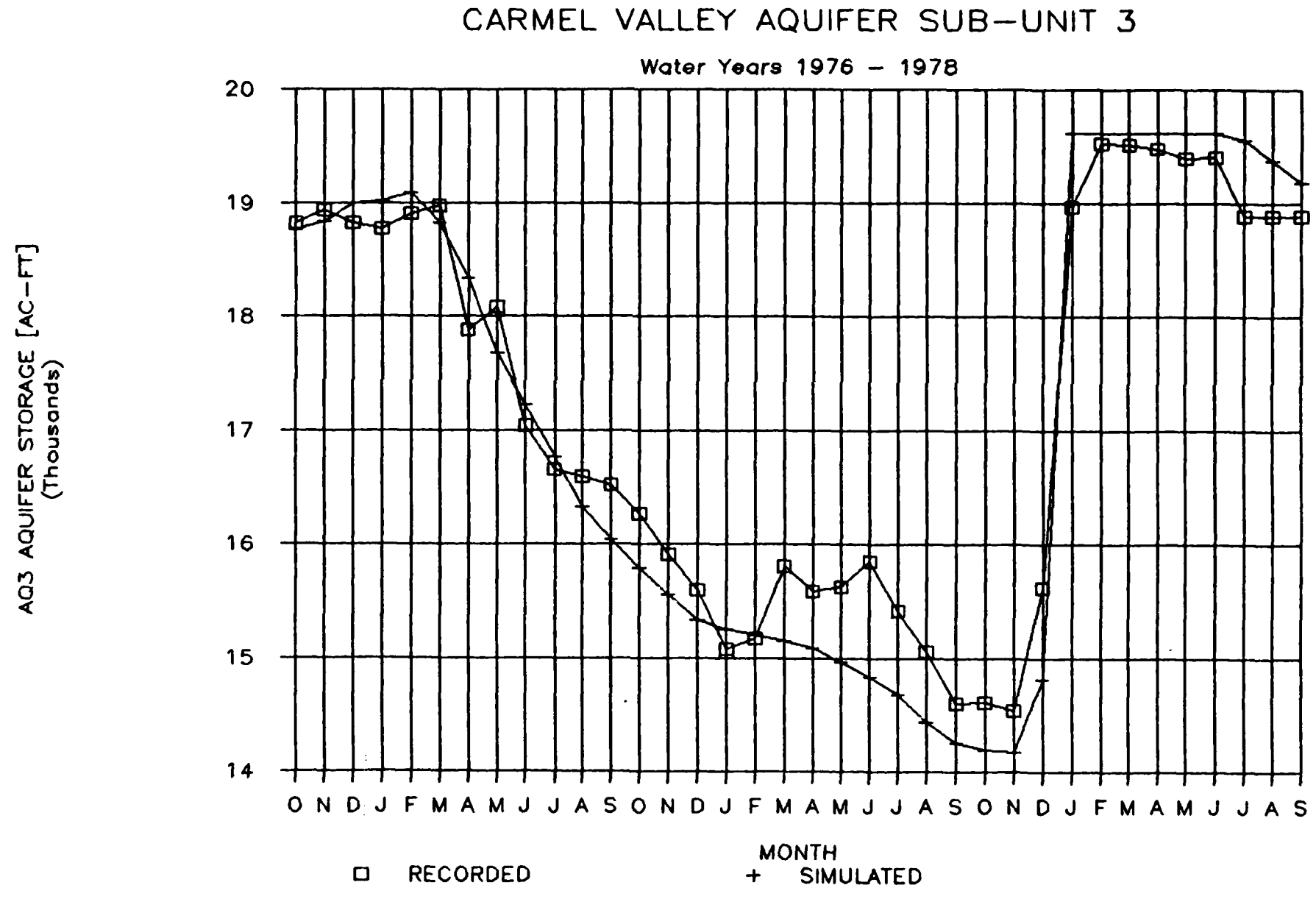

CARMEL RIVER NEAR CARMEL
Water Years 1976 – 1978
CARMEL RIVER FLOW [AC-FT]
(Thousands)
50
40
30
20
10
0
O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S
MONTH
RECORDED
SIMULATED

Figure 6


CARMEL VALLEY AQUIFER SUB-UNIT 3
Water Years 1976 - 1978
AQ3 AQUIFER STORAGE [AC-FT]
(Thousands)
20
19
18
17
16
15
14
O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S
MONTH
RECORDED
SIMULATED

APPENDIX B

List of Technical Support Documents

APPENDIX B

SELECTED REFERENCES ON ISSUES PERTINENT TO THE NEW SAN CLEMENTE PROJECT EIR/EIS

Numerous studies have been performed on water supply and environmental issues relating to the New San Clemente EIR/EIS. As it would be cumbersome to reprint them all in the appendix section, the following list was developed. It provides the titles of selected studies on various topics, organized by subject matter. The most recent reports are listed first. All reports are available for public review at the district office. A complete list of original documents is available upon request.

NEW SAN CLEMENTE PROJECT DESCRIPTION

Stern Henrietta, 1987. Description of New San Clemente Project and "No Project" Conditions. MPWMD Technical Memorandum 87-15; June 1987.

Converse Consultants, 1987a. New San Clemente Project Engineering Summaries of Additional EIR Alternatives; May 1987.

_____, 1987b. New San Clemente Project Fish Conveyance Facilities Preliminary Design and Cost Estimate; April 1987.

_____, 1986. Final New San Clemente Project Preliminary Design and Cost Estimate; November 1986.

GEOLOGY/GEOTECHNICAL/SEISMIC

Converse Consultants, 1986. Final New San Clemente Project Preliminary Design and Cost Estimate; November 1986.

Rogers Johnson Associates, 1986. Preliminary Report of Landsliding in the Vicinity of the Proposed New San Clemente Reservoir; January 1986.

Geomatrix, 1985. Evaluation of Seismic Design Criteria - New San Clemente Dam; May 1985.

Rogers Johnson Associates, 1985a. Investigation of Possible Fault Outlets in Stream Terraces along the Carmel River at Sleepy Hollow; April 1985.

_____, 1985b. New San Clemente Dam Geotechnical Investigation of Faulting in the Knothole Area; January 1985.

_____, 1984a. New San Clemente Dam Geothechnical Investigation: Location of Faults Through or Near the Proposed Dam Site; July 1984.

_____, 1984b. New San Clemente Project Geotechnical Studies for the EIR; May 1984.

HYDROLOGY AND WATER QUALITY - CARMEL VALLEY

The district has developed a computer model (CVSIM) that simulates the Carmel Valley water resource system. Several technical memoranda on various aspects of the model have been prepared; pertinent references are included here.

Fuerst, Darby, 1987a. Overview of the Carmel Valley Simulation Model. MPWMD Technical Memorandum 87-01; September 1987.

_____, 1987b. Carmel River Streamflow Characteristics. MPWMD Technical Memorandum 87-08; in preparation.

Oliver, Joseph, 1987. Effects on the Upper Carmel Valley Aquifer from Additional Well Development. MPWMD Technical Memorandum 87-10; June 1987.

_____, 1986a. Estimation of Ground-Water Outflow from Carmel Valley Aquifer Subunits; MPWMD Technical Memorandum 86-04; July 1986.

_____, 1986b. Carmel Valley Ground-Water Storage Calculation. MPWMD Technical Memorandum 86-01; April 1986.

US Geological Survey, 1984. Analysis of the Carmel Valley Alluvial Ground-Water Basin; June 1984.

US Army Corps of Engineers, 1981. Feasibility Report on Water Resources Development - Carmel River; May 1981.

HYDROLOGY AND WATER QUALITY - SEASIDE BASIN

Oliver, Joseph, 1987. Summary of Seaside Coastal Ground-Water Basin Evaluation. MPWMD Technical Memorandum 87-09; May 1987.

Staal, Gardner and Dunne,1987a. Hydrogeologic Investigation - Seaside Coastal Ground-Water Basin Evaluation; May 1987.

_____, 1987b. Fort Ord Ground Water Monitoring Well Project; January 1987.

_____, 1986. Final Phase I Hydrogeologic Assessment of Laguna Seca Subarea, Monterey County, California; August 1986.

Converse Consultants, 1985. Final Phase I Report (and Addendum)- Ground-Water Evaluation of the Seaside Aquifer; May 1985.

US Geological Survey (Ken Muir), 1982. Groundwater in the Seaside Area; September 1982.

FISH/AQUATIC HABITAT

DW Kelley and Associates, 1987a. Assessment of the Carmel River Steelhead Resource, Volume II: Evaluation of the Effects of Alternative Water Supply Projects on the Carmel River Steelhead Resource; June 1987 (Draft).

_____, 1987b. Preservation of Carmel River Steelhead with Fish Passage Facilities Over New San Clemente Dam or with a Hatchery Near its Base; April 1987.

_____, 1986. Assessment of the Carmel River Steelhead Resource, Volume I: Biological Investigations; September 1986.

_____, 1984. Evaluation of Alternative Upstream Fish Passage Facilities Over New San Clemente Dam; August 1984.

WILDLIFE/ENDANGERED SPECIES

Roberson, Don and Robin, 1987. Carmel River Bird Survey (includes Least Bell's Vireo assessment); June 1987.

Williams, Molly, 1983a. Riparian Mammals and Herptofauna of Carmel Valley. CRWMP Working Paper No. 4.5; October 1983.

_____, 1983b. Avifauna of the Carmel River Riparian Corridor. CRWMP Working Paper No. 4; August 1983.

VEGETATION

Stern, 1987. Draft Riparian Mitigation Plan for the New San Clemente Project, Carmel River, Monterey County; July 1987.

Williams, John, 1983. Habitat Change in the Carmel River Basin. CRWMP Working Paper No. 1; January 1983.

Beattie, Joan and Patti Murphy, 1981. Vegetation of the Carmel River Valley; October 1981.

CARMEL RIVER CHANNEL STABILITY AND SEDIMENT TRANSPORT

Matthews, 1987. Evaluation of the Effects of Feasible New San Clemente Project Alternatives on Channel Stability and Sediment Transport of the Carmel River. MPWMD Technical Memorandum 87-13; June 1987.

Curry, R. and G. Kondolf, 1983. Sediment Transport and Channel Stability, Carmel River, California; December 1983.

BEACH REPLENISHMENT

Thornton, Edward and Saad Abdelrahman, 1987. Impacts on Carmel River State Beach due to the New Dam at San Clemente; July 1987.

PUBLIC SAFETY

Converse Consultants, 1987, New San Clemente Project Dam Break Study Report; May 1987.

NOISE

WESTEC, 1984. Noise Assessment for San Clemente Dam Enlargement, Upper Carmel Valley, Monterey, California; January 1984.

TRAFFIC

Kimmel, Herman and Associates, 1983. Traffic Engineering Analysis, San Clemente Dam Project; December 1983.

CULTURAL RESOURCES/ARCHAEOLOGY

Archaeological Consulting (Paul Hampson), 1987. Archaeologic and Historical Investigations for the San Clemente Dam EIR/EIS, Carmel Valley, Monterey County, California; May 1987.

WESTEC, 1983. Cultural Resources Survey for the San Clemente Dam Enlargement, Upper Carmel Valley, Monterey, California; December 1983.

GROWTH/CUMULATIVE IMPACTS

Stern, Henrietta, 1986. Development of Water Demand and Land Use Projections in the Years 2000 and 2020 with and without a Water Supply Project; November 1986.

EIP Associates, 1986. Interim Growth Impacts Study for the San Clemente Dam; November 1986.

WATER SUPPLY ALTERNATIVES

Reports too numerous to list here have been prepared concerning various water supply alternatives. The following two reports document a three-phase evaluation and supplemental analysis that encompassed a broad range of possibilities.

Stern, Henrietta, 1987. Supplementary Evaluation of Water Supply Alternatives for the Monterey Peninsula; May 1987.

_____ and Bruce Buel, 1987. Final Evaluation of Water Supply Alternatives for the Monterey Peninsula; January 1987.

CONSERVATION

MPWMD, 1987. Water Conservation Plan for Monterey County; July 1987.

MPWMD MANAGEMENT PLANS

Greenwood, Ken, 1987. Carmel Valley Watershed Management Plan (in preparation).

Page, Gary and Graham Matthews, 1984. Carmel River Management Plan; March 1984.

APPENDIX C1

Avian Survey

CARMEL RIVER BIRD SURVEY

May 1987

Prepared for

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

and

ENVIRONMENTAL IMPACT PLANNING CORPORATION
319 Eleventh Street
San Francisco, CA. 94103

By

Don & Robin Roberson

June 1987

TABLE OF CONTENTS

CARMEL RIVER BIRD SURVEY

I. INTRODUCTION AND SUMMARY

Between 2-31 May 1987, we surveyed the Carmel River from the San Clemente Dam to the mouth and the two major tributaries of San Clemente Reservoir for birds. The primary purpose of the survey was a search for the endangered Least Bell's Vireo Vireo bellii pusillus. We found none. Secondary purposes were to confirm and map specified habitats along the river and to survey the bird populations in those habitats. The results are enumerated below, showing quite extensive riparian habitat and correspondingly healthy bird populations.

II. METHODS

We walked the 18.5 mile stretch of the Carmel River from San Clemente Dam to the river mouth three times, thus surveying in early (2-12 May), mid (15-19 May) and late (28-31 May) May. In addition, nearly a mile of San Clemente Creek upstream from the reservoir and over two miles of the Carmel River upstream from the reservoir were surveyed twice, the latter area's survey including a survey of night birds as well. In all, we walked approximately 62 miles of riparian habitats over a 16 day period, for a total of 74½ hours in the field.

Below the Dam the River was divided into 7 separate stretches (more fully described below). Each stretch was between 2.5 to 3.5 miles in length, except for the one-mile stretch from Hwy 1 to the river mouth lagoon. These stretches, plus the upstream reaches of the Carmel and San Clemente, were surveyed by walking either in or adjacent to the riverbed slowly, keeping a running tally of all birds heard or seen. All surveys were conducted between 6 a.m. and noon (prime time for most bird song) and took between 2 and 4 hours on the average, thus surveyed at a pace just under a mile an hour. This slow pace was often necessitated by the rough terrain; often walking in water, occasionally even chest high or moving slowly through thick riparian habitat sometimes dominated by poison oak or nettles. The terrain was most difficult from the Dam to below Carmel Valley Village; below that point water levels decreased and the river stopped running entirely at either about Schulte Bridge (12 May) or just below Robinson Canyon Bridge (31 May), with only puddles and flow due to groundwater thereafter.

Riparian habitat fringes the entire river thinly and only near the Cal-Am filter plant was the habitat judged wide enough to require some zig-zagging to survey the entire area. At all other points, we believe we surveyed the entire riparian community thoroughly and our surveys often included birds on the edge of the adjacent habitats (especially where cliffs reach the river's edge with oak woodlands or chapparel) or flying over.

About 80% of the birds recorded were heard singing or calling only. The ability to survey by bird song/call is crucial in obtaining acceptable bird surveys in breeding season (Robbins et al 1986).

III. BELL'S VIREO SURVEY

The California race (pusillus) of the Bell's Vireo (Vireo bellii), known as the "Least Bell's Vireo" is one of California's most endangered passerine birds. Once considered common to abundant in riparian ecosystems throughout much of California, it is now reduced to perhaps just 300 breeding pairs (U.S. Fish & Wildlife Service 1986). Destruction of riparian habitat coupled with high rates of parasitism by Brown-headed Cowbird Molothrus ater have contributed to this unparalled decline; a full historical summary and statewide survey is in Goldwasser et al.(1980). The precipitous decline is unparalled in California ornithology for a songbird, though less serious declines have been documented in other primarily riparian species, such as Yellow-billed Cuckoo Coccyzus americanus (Gaines & Laymon

1984), Willow Flycatcher Empidonax traillii, Yellow Warbler Dendroica petechia and Yellow-breasted Chat Icteria virens (e.g., Roberson 1985).

We found no published information showing presence of Bell's Vireo on the Carmel River even in historic times. The Carmel Valley was not indicated as within the range of the species by the classic California survey (Grinnell & Miller 1944) nor by the comprehensive historical summary on Bell's Vireo (Goldwasser et al 1980). No records for the Carmel River are indicated in the most recent in-depth summary of bird distribution in Monterey County (Roberson 1985). It is quite possible the species never nested on the Carmel River.

Nonetheless much apparent habitat exists. Bell's Vireos were known to be common on the Salinas River in southern Monterey County in the first part of this century (Grinnell & Miller 1944) but surveys of the Salinas River sites in the 1970s found them entirely absent (Goldwasser et al 1980). Yet informal surveys by local birders re-discovered the bird around Bradley, on the Salinas River, in 1983, when nesting was documented (Roberson 1985) and their presence was again noted in 1984. However no birds were detected in brief attempts in 1985 and 1986 (pers. obs.). Thus the re-discovery on the Salinas suggested the possibility birds might be present on the Carmel. Williams'(1974)local checklist also listed Bell's Vireo as "accidental" in the Monterey Peninsula area, giving at least the implication that there were some unpublished historic records in the Carmel area.

Bell's Vireo is a summer resident of riparian habitats dominated by a mixture of canopy trees (for feeding) and low riparian growth (for nesting). They still occur in appropriate habitat in warmer interior valleys of coastal counties from Santa Barbara County south, and at some desert oases and canyons. Typical plants required include willows (Salix sp.), mulefat or guamote (Baccharis glutinosa)and wild blackberry (Rubus ursinus). A recent survey at Camp Pendleton, San Diego County, found 100 territorial males and 323 nests, of which nearly 60% were in willows (Salata 1987). The Bradley nest in 1983 was in Baccharis adjacent to willows (pers. obs.). Much willow/Baccharis habitat exists along the Carmel River.

Despite the presence of much apparently suitable habitat observed during this survey, no Bell's Vireos were found. Given the very tenuous status of the Salinas River birds, in an area where they were once common, this finding was not surprising in an area from which there is no historical published records. Furthermore, the southern coastal populations are heavily impacted by cowbird parasitism (Jones 1985, Hays 1986) and one would expect northern coastal populations, if any, to be equally impacted. We found high populations of cowbird on the Carmel River near its mouth; these densities might eliminate any embroyonic Bell's Vireo population in at least the lower 15 miles of the Carmel River.

As Salata noted in his recent experience, "Bell's Vireos are extremely vociferous throughout most of the breeding season" (Salata 1987, p. 3). The persistent loud singing of the male is the best clue to the bird's presence, as they are often difficult to observe in their preferred dense riparian habitat (Goldwasser et al 1980, Salata 1987, pers. obs.). Our surveys took place during what should have been the height of the singing period, as populations just to the south are composed of birds arriving by the end of April (Lehman 1982); May should be the best month to locate the species in Monterey County, if present. Given the persistancy of singing, the loudness and distinctiveness of the song, the narrowness of the riparian habitat and the triple surveys of each appropriate area, we can say with a high degree of confidence that no Bell's Vireos were present in 1987. However, given the disappearance, re-discovery and re-disappearance of the bird on the Salinas River, it may be that birds might be found in another year. We believe the area near and just downstream from the filter plant appears (to human eyes) the best potential vireo habitat, particularly since cowbird numbers were lowest there and become much more abundant farther downstream.

In the final analysis, though, the absence of Bell's Vireo in the Carmel Valley may not be due to lack of habitat (which appears to be present in abundance) or due the density of cowbirds, but could be a result of geography. The range of Bell's Vireo in California is entirely outside the summer fog belt and Bell's Vireo breeds in warm to hot climates (Goldwasser et al 1980). Although we had clear warm weather during early and late May, the middle of the month was dominated by low clouds and fogs extending up the Valley to the Carmel Valley Village. Although we have not undertaken a climatic survey of the area, it is a working hypothesis that the presence of summer fog limits the range of Bell's Vireo in an area with otherwise suitable-appearing habitat.

IV. HABITAT SURVEY

During our bird surveys, we were asked to observe and help map the various riparian habitats along the Carmel River. We were provided with a Riparian Habitat Classification prepared by Rick Villasenor of Environmental Impact Planning Corporation (Table 1) and asked to "ground-truth" the designation of habitats on large, detailed aerial photos of the river from the filter plant to Hwy 1. We placed polygons arounds sections of habitats on the photos, giving each such section a specific designation. To some extent, these designations merge into the next and lines drawn between designations are approximations at best. The marked up aerials have been returned to Graham Matthews of the Monterey Peninsula Water Management District, who had prepared the original block designations which we observed and compared to the Classifications. We found only minor changes from the original scheme of block designations.

A rough approximation of habitats is shown on Map 1. A very general overview shows mostly Mixed Evergreen Forest/Riparian above the dam with only small patches of purer Riparian Woodland/Thicket, a predominance of the Riparian Woodland/Thicket habitat below the dam to nearly Valley Greens Drive, and mostly Riparian Forest (with taller canopy of cottonwoods) thereafter until the Emergent Vegetation appears around the river mouth lagoon. Various stretches interspersed were best termed Riparian Scrub (many more small patches than shown on Map 1) and Mixed Evergreen Forest/Riparian (mostly oak woodland, but occasionally chaparral) abutted on the river where steep cliffs brought this habitat to the river's edge. Ruderal or non-native habitat included rip-rap banks, planted eucalyptus, and disturbed golf course habitats along the river. We have not designated the surface water or Dry Wash habitats, but these include the entire riverbed proper.

The Riparian Habitat Classifications do not have much use in defining bird habitats, because most species habitats are more clearly defined "micro-habitats" for each major activity; e.g., Acorn Woodpecker is present where there are large dead trees to use for nesting. They are present in the riparian zone where large dead trees, particularly sycamores, are standing, without reference to "scrub", "thickets","woodland" or "forest" designations. They are equally at home and widespread in the adjacent oak woodland component of Mixed Evergreen Forest. In the main bird list, we do attempt to generally place the species within its preferred habitat. Miller (1951) has a standard discussion of California bird habitats.

Despite the "micro-habitat" preference of most species, the generalized "Riparian" designation does have use in defining bird populations. Within the general rubric of Riparian we would include the Riparian Scrub, Northern Riparian Woodland/Thicket and Riparian Forest designations and the riparian edge only of the Mixed Evergreen Forest/ Riparian designation. This generalized Riparian habitat has many species either exclusively or predominately associated or restricted to it. It is a rapidly declining habitat in California, yet crucial for healthy populations of numerous species (Miller 1951, Small 1974, Remsen 1977). This Riparian habitat does occur along the Carmel River for most of its length and, as will be noted in the following bird list, does support good populations of riparian specialist species. We found good numbers of Warbling Vireo Vireo gilvus and Yellow Warbler, which have been declining elsewhere in Monterey County and statewide (Roberson 1985) and probably three pairs of Yellow-breasted Chat, whose local populations have declined to near the critical state. These

species suffer from the same circumstances that have endangered the Bell's Vireo, namely riparian habitat destruction and cowbird parasitism, so that the presence of these species on the Carmel indicates a comparatively healthy riparian ecosystem. Preservation of this riparian ecosystem should be an important component in any management plan for the Carmel River.

Below we give brief descriptions of the stretches of the Carmel and San Clemente surveyed, indicating an approximation of the mileage covered in each stretch and the habitats encountered. Each such stretch has been labelled with letter from A-I, and these symbols reappear in the bird lists themselves to designate the particular area discussed. In the bird lists, we also indicate which time frame the particular stretch was surveyed by indicating either the 1st, 2nd or 3rd time surveyed. Thus a designation of "C2" indicates this refers to the 2nd time the strech labelled "C" (Dam to Filter Plant) was surveyed. The exact date of this survey appears in the descriptions below.

A: CARMEL RIVER UPSTREAM FROM RESERVOIR (2+ mi.)

A strikingly scenic area with the river flowing in a moderately steep canyon, dominated by Mixed Evergreen Forests with a riparian fringe and few denser patches of willows adjacent to the river. The avifauna is much more reminescent of higher elevations in the Santa Lucia Mnts., e.g. the abundance of Steller's Jay and Mountain Quail (with California Quail restricted to the dense riparian only and to chaparral away from the river). Figure 1 shows one such stretch, including cliffs (left-center) where White-throated Swifts are nesting.
SURVEYS: A1=4 May (Don & Robin); A2=16 May (Don & Robin). (Both times we slept overnight adjacent to the survey area and recorded nightbirds also).

Figure 1: Carmel River about 1½ mi. above reservoir

Figure 2 shows the San Clemente Reservoir and Dam, surrounded on all sides by oak woodlands without any riparian fringe. This habitat is inappropriate for Bell's Vireo (Miller 1951, Grinnell & Miller 1944) so was not surveyed, though we did casually note species present when we crossed this habitat and sometimes comment thereon.

Figure 2: San Clemente Reservoir encircled by oak woodlands

B: SAN CLEMENTE CREEK UPSTREAM FROM THE RESERVOIR (@1 mile)

A very steep-walled canyon composed entirely of Mixed Evergreen Forest without a true riparian component. There was a small stand of redwoods in the upper reaches of the survey area, and thoughout the undergrowth includes a profusion of ferns. As a potential inundation area, this area was surveyed twice, but it is entirely unsuitable for Bell's Vireo. SURVEYS: B1=2 May (Don); B2=7 May (Don).

(Irrelevent to this project, but interesting nonetheless, was the finding of a Coast Horned Lizard Phrynosoma coronatum at the upper end of the trail leading to San Clemente Creek on 7 May; figure 3).

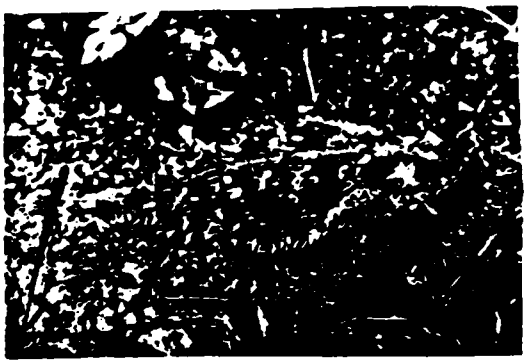


Figure 3: Coast Horned Lizard

C: DAM to FILTER PLANT (2½ miles)

This stretch has two distinct elements, demarcated at the point where the steep closed-in canyon opens up to a broader wide canyon, at a point just about where the San Clemente loop road crosses the Carmel River via a ford. Above this point, the habitat is best termed Mixed Evergreen Forest/Riparian, with many oaks and sycamores lining the canyon, interspersed with steeper slopes of chaparral, and willow patches only here and there along the river, with many alders forming a canopy forest. This "closed-in" canyon habitat is shown in figure 4 and is quite different from the remaining habitats downstream. We found a pair of nesting Dippers in this gorge; Steller's Jay were common and the entire "feel" is of an upper elevation avifauna (though entirely below 500' elevation). Below the ford, the canyon widens (figure 5)

Figure 4: Carmel River below San Clemente Dam

Figure 5: Carmel River above Filter Plant

and becomes dominated by true Northern Riparian Woodland/Thicket. The widening of the canyon seems to demarcate the ranges of several species; European Starling, Brown-headed Cowbird and Scrub Jay, for example, were not found above this line; Steller's Jay and Dark-eyed Junco (essentially montane and closed-cone pine forest birds) were quite scarce below this line.

In the area of the filter plant and just downstream, the riparian growth extends out widely as Riparian Scrub and we criss-crossed this habitat several times. The area just below the filter plant, composed of the Scrub, several Thickets, and some pools surrounded by reeds (and nesting Red-winged Blackbirds), seems the most appropriate habitat on the entire river for Bell's Vireo. Factors other than habitat, though, as discussed above, may be responsible for the absence of the bird here.
SURVEYS: C1=5 May (Don); C2=17 May (Robin); C3=29 May (Don).

D: FILTER PLANT to ROSIE'S BRIDGE (2½ miles)

Actually, this stretch begins (and the previous stretch ends) at a point ¼ mile below the filter plant itself, on the edge of the widest section of Riparian Scrub and described under C, above. The entire stretch has much healthy Riparian Thicket/ Woodland and was surveyed mostly from the stream by wading.
SURVEYS: D1=5 May (Robin); F2=17 May (Don); F3=29 May (Robin).

E: ROSIE'S BRIDGE to GARLAND RANCH (3½ miles)

Another stretch with mostly Riparian Woodland/Thicket, interspersed with some Riparian Scrub and with several splaces where steep cliffs bring Evergreen Forest to nearly river's edge. There are some deep pools skirting around Carmel Valley Village (colonies of Red-winged Blackbirds) near which is some particularly thick Riparian Thicket habitat which supports a pair of Yellow-breasted Chat which were documented as breeding during the survey. This area also apppears quite suitable for Bell's Vireo if they were present in the Carmel Valley. There are several areas where willows are being reintroduced, but as yet there is little bird colonization of this reforestation.
SURVEYS: E1=11 May (Don); E2=18 May (Robin); E3=30 May (Don).

F: GARLAND RANCH to ROBINSON CANYON BRIDGE (2½ miles)

A mixture of Riparian Woodland/Thicket, Riparian Scrub, some reforestation, and extensive Ruderal (non-native) habitats, the latter taking the form of planted stands of eucalyptus and rip-rap and disturbed scrub adjacent to a golf course. Opposite the golf course, just upstream from the Bridge, is a steep cliff with a large colony of Cliff Swallow. When appropriate, the wider Riparian Scrub habitats were criss-crossed on the survey, but in general the area appears too disturbed and too filled with cowbirds to be appropriate Bell's Vireo habitat.
SURVEYS: F1=11 May (Robin); F2=18 May (Don & Rick Villasenor); F3=30 May (Robin).

G: ROBINSON CANYON BRIDGE to VALLEY GREENS DRIVE (3 miles)

At the upper end are some nice stands of Riparian Thicket/Woodland, but sometimes shortly thereafter (by the Schulte Bridge during this May) the streamflow disappeared to be replaced from place to place by pools. Riparian Scrub is found in much of the central stretch, but is slowly replaced by a denser and taller canopy, eventually designated as Riparian Forest, by the time Quail Lodge golf course area is reached.
SURVEYS: G1=12 May (Don); G2=19 May (Robin); G3=31 May (Robin).

H: VALLEY GREENS DRIVE to HIGHWAY 1 BRIDGE (3½ miles)

The upper end of the stretch, from the Quail Lodge golf course to Via Mallorca Drive, is a very attractive strech of Riparian Forest with a tall canopy of cottonwoods, pools of water, and dense undergrowth, supporting a healthy riparian avifauna despite the presence of numbers of cowbirds. The wildness of this area is illustrated by the

presence of a Bobcat Lynx rufus watched hunting amongst the pools and undergrowth on 31 May. Downstream a mixture of Forest and Scrub is interspersed along the Carmel Valley golf course, sometimes with extensive Dry Wash. From the golf course downstream to the Hwy 1 Bridge, the Forest canopy again becomes predominate and comparatively undisturbed.
SURVEYS: H1=12 May (Robin); H2=19 May (Don); H3=31 May (Don).

I: HIGHWAY 1 BRIDGE to RIVER MOUTH LAGOON (1 mile)

Until the emergent vegetation at the lagoon appears, the entire stretch is healthy Riparian Forest with some undergrowth supporting species (e.g. House Wren, Wrentit) not present in the upstream stretches of Riparian Forest. At the river mouth itself is a lagoon used for bathing by gulls and feeding by shorebirds; these species are not considered a part of this riparian survey but were briefly noted. In addition, the coastal scrub on "Cross Hill" just at the mouth was surveyed; it supports the only population of White-crowned Sparrow on the entire river (their range being restricted to coastal scrub in Monterey County; Roberson 1985). There is also a reedy pond with a colony of Red-winged Blackbirds below the Hill which hosted single Virginia's Rail and Common Yellowthroat, riparian species restricted to this coastal pond-type habitat and which may, or may not, be nesting here.

This entire stretch is the one well-known and well-birded stretch of the Carmel River. Over 270 species have been recorded here, including some of the rarest vagrants which have ever occurred in California; e.g. Black-billed Cuckoo, Broad-billed Hummingbird (2nd Northern California record at the time), White-rumped Sandpiper (3rd state record), Buff-breasted and Sharp-tailed Sandpipers, Cerulean, Yellow-throated, Prothonotary and Mourning Warblers (Roberson 1985). The area is surveyed almost daily by birders from mid-August to mid-November, the height of fall migration. Our notes show over 30 hours expended by us in the 60 day stretch 4 Sep-4 Nov in 1986. Assuming that only 20 other birders expend similar efforts (15 hrs/fall migration), an assumption which is likely well-underestimated since the area is birded on weekends heavily by birders from the Bay Area, often in groups up to 20-30 birders, this one-mile stretch of the Carmel receives 330 person-hours of use by recreational birders, whose efforts are adding to the knowledge compiled for use in ornithology as the results are published in American Birds and elsewhere. This 330 person-hours in a mile stretch over a two-month period compares with an estimated 558 person-hours spent fishing per mile for steelhead during the Jan-Feb 1984 season (based on Dettman 1986). As the prime fall migration period is Sep-Oct, a period when no steelhead migration of import is taking place (see Dettman & Kelley 1986), any management plan for the Carmel should take into consideration the access needs of the recreational birdwatcher and field ornithologist. Access to this important stretch of the Carmel has heretofore been available by walking the dry river bed in autumn from the Hwy 1 bridge to the lagoon.

Even during our surveys, other birders were surveying this stretch and did discover two migrants, a Rose-breasted Grosbeak Pheucticus ludovicianus and a Yellow-breasted Chat, which were missed on our surveys of this stretch. Migration is very volatile here, though the healthy breeding populations were reconfirmed each time.
SURVEYS: I1=9 May (Robin); I2=15 May (Don); I3=28 May (Don).

V. BIRD SURVEY RESULTS

We recorded 199 species of birds in, over or immediately adjacent to the riparian habitat on the Carmel River. An additional 5 species (Brown Pelican, Whimbrel, and Heermann's, California and Western Gulls) were recorded at the river mouth lagoon. We obtained positive nesting evidence in the riparian zone or immediately adjacent for 41 species and probable nesting evidence for another 31 species; we believe these 72 species regularly nest on the Carmel (another, Blue-gray Gnatcatcher, nests just above the riparian zone around San Clemente Reservoir, and Rufous-crowned Sparrow probably does as well). Possible nesting evidence was obtained for 5 species. The

remaining species were migrants, or, in a few cases, species which nest elsewhere in Monterey County (even the adjacent hills to Carmel Valley) and use the River only for feeding (e.g., Black-crowned Night-Heron) or were simply overflying the Valley (e.g., Turkey Vulture, which also roosts in numbers on the river).

Under each species we present general comments, a complete table of our survey results, and a "birds per mile" figure for each stretch of the river as previously discussed. This "birds per mile" figure is an attempt to give some comparative statistics regarding the population density on the river, rather than an actual population estimate. Observer bias, detection ability, and weather all impact counts in linear surveys; our study was not designed to obtain actual population estimates (see Robbins et al 1986). To obtain the "birds per mile" total we averaged the two highest counts (throwing out low counts which reflect poor weather or detectability during one survey, yet averaging to downplay the effects of migrant individuals or the effects of possible overcounting), then multiply by a "detection factor". This "factor" is a number between 1 and 2 and is a subjectively (but carefully) determined estimate of the detectibility of the species. Swallows, hawks and ducks, for example, we believe are entirely detected, so their factor is simply "1". In contrast, we detect only the singing male Wrentits (quiet females being very difficult to detect in the dense preferred chaparral or thick scrub) so, to make a comparison of the number of Wrentits to, say, Violet-green Swallow, we must multiply the Wrentit count by two to have an objectively comparable population estimate. For many passerine birds, the factors are 1.5 or 1.75, indicating our estimate that most birds recorded are singing males, but some (between ¼ and ½) of the presumed present females are detected as well. Dependent young are not counted in our figures (except to be mentioned under breeding). The averaged count, adjusted by the "factor", is then divided by the miles (approximate) in that particular stretch to obtain the "birds per mile" figure (rounded to the nearest whole numbler).

We also indicate any nesting evidence obtained, whether Confirmed, Probable or Possible, using standard Breeding Bird Atlas criteria (Table 2). Each such evidence is cross-reference to the stretch of river and the date surveyed. Thus a"FL(C2)" for Common Merganser will be read as "downy young" (FL on Table 2) observed on stretch C (Dam to Filter Plant) on the 2nd survey (17 May).

VI. SPECIES ACCOUNTS

DOUBLE-CRESTED CORMORANT *Phalacrocorax auritus*

Factor: 1

Date	A	B	C	D	E	F	G	H	I

Not in riparian; single immature on San Clemente Resevoir 2 May - a migrant. There is one small nesting colony on the Big Sur coast (Roberson 1985)

GREAT BLUE HERON *Ardea herodias*

These are simply migrants or non-breeding summerers feeding along the river. Nearest nesting colonies are in southern Monterey Co.
Factor: 1

Date	A	B	C	D	E	F	G	H	I
1					2	2	1	1	1
2					2	1	1		
3	—	—	—	—	—	3	—	1	1
Birds/mi.					1	2	1	1	1

GREAT EGRET *Casmerodius albus*

Factor: 1

Simply one migrant; nearest nesting colonies are in the Bay Area or the Central Valley.

Date	A	B	C	D	E	F	G	H	I
1									
2					1				
3									

GREEN-BACKED HERON *Butorides striatus*

Not known to nest on the Carmel (Roberson 1985) but we suspect they could nest here. Factor: 1

BREEDING: Possible (birds as shown, in correct season, appropriate habitat)

Date	A	B	C	D	E	F	G	H	I
1				2	1			2	2
2					3			1	1
3	—	—	—	—	1	1	—	1	—
Birds/mi.				1	1	1		1	1

BLACK-CROWNED NIGHT-HERON *Nycticorax nycticorax*

Date	A	B	C	D	E	F	G	H	I
1					2	3	8	2	
2					12		10	1	2
3	_	_	_	_	7	1	2	1	_
Birds/mi.					3	1	3	1	1

These are simply birds feeding up the river, presumably from their only known nesting colony at Carmel Point. We recorded about equal numbers of adults and immatures. Factor: 1

MALLARD *Anas platyrhynchos*

Date	A	B	C	D	E	F	G	H	I
1	2		5	7	14	32	11	7	6
2	5		7	5	23	18	10	2	10
3	_	_	6	18	6	19	5	_	20
Birds/mi.	2		3	5	5	10	4	1	15

We found evidence of nesting along the entire Carmel, though flocks of birds were non-nesters, including the average of 15 birds on the river mouth lagoon. Factor: 1

BREEDING: Confirmed NL(E1-broods of 3,10,4,5&4 young each; C2; I2- 4 yng; G2- 3 yng; E3-broods of 6 & 9 yng; F3-broods of 12 & 2 yng; H3). Also brood of 8 yng w/female on San Clemente Reservoir 2 May.

CANADA GOOSE *Branta canadensis*

Date	A	B	C	D	E	F	G	H	I
1									2
2					4				
3									

The sightings were of pairs flying up-river, showing characteristics of the large race *moffitti*. These birds have been introduced and are breeding in the upper Carmel Valley; they use the lagoon for feeding. Factor: 1

CINNAMON TEAL *Anas clypeata*

Date	A	B	C	D	E	F	G	H	I
1									5
2									
3									

The group of 5 at the lagoon included 2 BREEDING:Probable D(I1), however they were not found thereafter and they may simply have been displaying on migration. However, the species could nest here given favorable water conditions and do nest at the Salinas River mouth and elsewhere in Monterey County. Factor: 1

COMMON MERGANSER *Mergus merganser*

Date	A	B	C	D	E	F	G	H	I
1	3	1	3	2					
2	3		4	1	1	1			
3	_	_	1	2	_	_	_	_	_
Birds/mi.	2	1	1	1	1	1			

One of our major findings was the confirmation of nesting on the Carmel by this species, previously unknown. All birds found were females, except for a single male on the Reservoir 2 May. Males do not help in rearing the young. Factor: 1

BREEDING: Confirmed FL(C1-brood of 8 yng; F2-brood of 8 yng; C2-brood of 8 yng; D2-brood of 8 yng), FE=female carrying broken egg (D1); ON(B1-female leaving nesthole in oak above San Clemente Creek).

TURKEY VULTURE *Cathartes aura*

Date	A	B	C	D	E	F	G	H	I
1	4		2	20	1	13	9	1	
2	2		3	5	18	1	20		
3				10	1	3			1

All birds are simply foraging well over the Valley opportunistically; birds/mi. has no relevence for such strategy. They nest in the mountains and foothills surrounding the Carmel Valley.

OSPREY *Pandion haliaetus*

One migrant over the river mouth lagoon 9 May.

BLACK-SHOULDERED KITE *Elanus caeruleus*

Two birds (pair?) seen near Garland Ranch 18 May might represent a pair breeding somewhere in the Carmel Valley, but they were not refound on subsequent surveys and could have been migrants.

SHARP-SHINNED HAWK Accipiter striatus

Single migrant near Robinson Canyon on 12 May.

RED-SHOULDERED HAWK Buteo lineatus

A riparian hawk evenly distributed along the Carmel.
BREEDING: Confirmed NB(I1), FY(D1).
Factor: 1.5

Date	A	B	C	D	E	F	G	H	I
1				4	1	5	2		3
2	1		3	2	4	1	2	1	2
3	—	—	1	1	5	3	2	1	1
Birds/mi.	1		1	2	2	2	2	1	4

RED-TAILED HAWK Buteo jamaicensis

A widespread hawk in many habitats rather evenly distributed along the Carmel. Surprisingly, we did find
BREEDING: Confirmed NE(E2).
Factor: 1

Date	A	B	C	D	E	F	G	H	I
1			1		2	2		3	
2	2		3	1	2	1	3	3	1
3	—	—	2	—	3	3	1	—	—
Birds/mi.	1		1	1	1	1	1	1	1

GOLDEN EAGLE Aquila chrysaetos

Single adult over Quail Lodge golf course 19 May. Does not nest in the riparian, but hunts overhead Carmel Valley from nesting sites in the Los Padres Nat'l Forest.

AMERICAN KESTREL Falco sparverius

Locally distributed in open areas such as Garland Ranch.
BREEDING: Confirmed NB(E2).
Factor: 1.75

Date	A	B	C	D	E	F	G	H	I
1					1	1			
2				1	2	1			
3	—	—	—	1	1	1	—	—	—
Birds/mi.				1	1	1			

CALIFORNIA QUAIL Callipepla californica

Widespread along the lower Carmel, but closely restricted to dense riparian above reservoir, where *coexists with Mountain Quail.*
BREEDING: Confirmed FL(E1-brood of 6 yng; H2-brood of 2 yng; E3-brood of 2 yng).
Factor 1.25

Date	A	B	C	D	E	F	G	H	I
1			7	7	14	3	36	19	2
2	2		5	11	13	10	23	22	
3	—	—	3	18	28	6	15	7	—
Birds/mi.	1		3	7	8	4	12	7	1

MOUNTAIN QUAIL Oreortyx pictus

Common on the Carmel above the Dam, in the dense woods & chaparral (but not in the riparian). A very low elevation (650') for this species.
BREEDING: Probable S(A2)
Factor: 2

Date	A	B	C	D	E	F	G	H	I
1	4								
2	8								
3	—	—	—	—	—	—	—	—	—
Bird/mi.	6								

VIRGINIA RAIL Rallus limicola

Single bird in pond below "Cross Hill" at river mouth on 9 May, probably a migrant, but nesting might be looked for here in the future.

KILLDEER Charadrius vociferus

Present in most dry washes and pool edges in lower Carmel River, but proof of positive nesting not obtained.
BREEDING: Probable T(all dates)
Factor: 1

Date	A	B	C	D	E	F	G	H	I
1	1				5	14	18	4	1
2	2				6	8	20	3	2
3	—	—	—	—	8	9	12	6	2
Birds/mi.	1				2	5	6	1	1

GREATER YELLOWLEGS Tringa melanleuca

Group of 3 migrants at Robinson Canyon Bridge on 11 May.

SPOTTED SANDPIPER Actitis hypoleucos

Despite widespread birds, no nesting evidence positive and numbers declined
BREEDING: Probable T(A2). Factor: 1

Date	A	B	C	D	E	F	G	H	I
1	1				1	2	1		1
2	2					4	1		1
3						1			
	1	—	—	—	1	1	1	—	1

LEAST SANDPIPER Calidris minutilla

A group of 3 breeding-plumaged migrants on the riverbed at the mouth on 15 May.

BAND-TAILED PIGEON Columba fasciata

Date	A	B	C	D	E	F	G	H	I
1				11	18	2		6	141
2				20	37		1	40	220
3				17	24			21	8

Virtually all pigeons were in large flocks (including the flock of up to 220 at the river mouth) and are best considered post-breeding dispersal birds. These flocks move widely after food post-nesting (the species nests very early) and a "bird/mi." figure would have no meaning, so is deleted.

MOURNING DOVE Zenaida macroura

Date	A	B	C	D	E	F	G	H	I
1	6		8	10	11	23	31	41	10
2	8		13	7	4	5	31	59	9
3	—	—	13	10	3	16	17	41	12
Birds/mi.	4		5	2	2	8	10	14	11

A common species of the lower Carmel with numbers distributed upstream throughout. Factor: 1
BREEDING: Probable D(A1,2 etc)

GREAT HORNED OWL Bubo virginianus

Date	A	B	C	D	E	F	G	H	I
1	2								
2	3								
3									
	—	—	—	—	—	—	—	—	—
Birds/mi.	1								

Only recorded on the upper Carmel because that was the only night surveying done, though known to occur throughout the Valley.
BREEDING: Probable S(A1,2). Factor: 1

NORTHERN PYGMY-OWL Glaucidium gnoma

Two calling in the evening of 4 May and another in oak woodlands above this area 16 May seen, indicate they are local residents and BREEDING: Probable S(A1). Another heard below the dam in the early morning 5 May.

LONG-EARED OWL Asio otus

One giving an unearthly scream-call repeatedly in the pre-dawn of 4 May along the upper Carmel upstream 1 mile from the Reservoir, suggests possible nesting in this riparian (which looks appropriate) though no nesting in this area is known (Roberson 1985)

WHITE-THROATED SWIFT Aeronautes saxatalis

	A	B	C	D	E	F	G	H	I
1	4		6		4	5	2	2	3
2	4		2	4	2	2	1		
3	—	—	4	1	10	17	—	2	—
Birds/mi.	1		2	1	2	4	1	1	1

Present and nesting around appropriate cliffs, but forages more widely. Factor: 1
BREEDING: Confirmed ON(A2;F2,3;E3).

ANNA'S HUMMINGBIRD Calypte anna

Date	A	B	C	D	E	F	G	H	I
1	3		3	7	14	9	18	20	9
2	7		10	5	16	11	22	9	11
3	—	—	4	4	2	4	5	4	8
Birds/mi.	4		4	4	6	6	10	6	14

Commonest on the lower Carmel but widely present throughout. Decrease in numbers late May probably reflects dispersal after end of breeding season. Factor: 1.5
BREEDING: Probable D(E1; G1,2,3).

ALLEN'S HUMMINGBIRD Selasphorus sasin

Date	A	B	C	D	E	F	G	H	I
1	1			1	10	3	18	9	6
2	1			1	5	2	10	14	1
3	—	—	—	3	5	6	5	4	4
Birds/mi.	1			1	3	3	7	5	4

Commonest in the lower Carmel, esp. around flowering eucalyptus or willow. One female both times at 650' on upper Carmel is approaching a local elevational record. Factor: 1.5
BREEDING: Probable D(E1,F1,G1,H1).

BELTED KINGFISHER Ceryle alcyon

Apparent pairs rather evenly distributed along the entire Carmel. Factor: 1

BREEDING: Confirmed ON,FY(G2); FY(E3).

Date	A	B	C	D	E	F	G	H	I
1	2		3	4	2	4	1		2
2	3		3	3	3	2	2		
3	—	—	3	1	2	4	1	—	—
Birds/mi.	1		1	1	1	2	1		1

ACORN WOODPECKER Melanerpes formicivorus

Restricted along the Carmel to the vicinity of dead trees, particularly sycamores, where colonies exist. Factor: 1.5

BREEDING: Confirmed NY(H3),ON(G2).

	A	B	C	D	E	F	G	H	I
1	2		6	10	16	19	4	4	1
2	2		5	6	16	7	13	6	
3	—	—	6	11	15	11	6	2	—
Birds/mi.	1		4	6	7	9	5	2	1

NUTTALL'S WOODPECKER Picoides nuttallii

Pairs are very evenly distributed throughout the riparian habitat; also common in adjacent oak woodlands. Factor: 1.5

BREEDING: Probable T(most dates).

	A	B	C	D	E	F	G	H	I
1	2		3	1	8		2		1
2	3		1	3	1	2	3	8	1
3	—	—	5	5	2	5	2	3	3
Birds/mi.	2		2	2	2	2	1	2	3

DOWNY WOODPECKER Picoides pubescens

Small numbers evenly distributed, irregularly detected (drumming season having past), with a decided center of population around the Riparian Forest downstream from Valley Greens Drive. Factor: 1.25

BREEDING: Confirmed NY(I2; H2-two different active nest holes with young).

Date	A	B	C	D	E	F	G	H	I
1	1						4	3	1
2			1	1	2	1		12	
3	—	—	2	1	1	—	—	10	2
Birds/mi.	1		1	1	1	1	1	4	1

HAIRY WOODPECKER Picoides villosus

A characteristic species of heavy forest at all elevations, we were surprised to find even this many in the riparian habitat. Factor: 1

BREEDING: Confirmed NY(A2), FY(A1, D2).

Date	A	B	C	D	E	F	G	H	I
1	1			2					
2	2		3				1	1	
3	—	—	5	1	—	—	—	—	—
Birds/mi.	1		2	1			1	1	

NORTHERN FLICKER Colaptes auratus

Rather thinly & evenly distributed, commonest just below dam. Partial to tall trees, dead trees. Factor: 1.25

BREEDING: Confirmed DD(D1-copulation).

Date	A	B	C	D	E	F	G	H	I
1	2	1	6	4	2	1	1	3	
2	3	1	6		2	2	4	2	
3	—	—	2	—	—	2	1	—	—
Birds/mi.	2	1	3	1	1	1	1	1	

OLIVE-SIDED FLYCATCHER Contopus borealias

Only a few calling birds in lower Carmel, which may, or may not, suggest nesting. Factor: 2(assumes nesting)

BREEDING: Probable? S(as shown).

	A	B	C	D	E	F	G	H	I
1							2		
2						3	1	1	
3						1			
	—	—	—	—	—	—	—	—	—
Birds/mi.						2	1	1	

WESTERN WOOD-PEWEE Contopus sordidulus

Rather common in the Riparian Forest, esp. between the golf courses in the lower Valley; a few upstream also. Factor: 1.25

BREEDING: Confirmed NB(H1).

	A	B	C	D	E	F	G	H	I
1		1		1		1	8	7	
2				3		4	12	21	
3	—	—	1	2	—	1	2	21	2
Birds/mi.		1	1	1		1	4	8	1

WESTERN FLYCATCHER Empidonax difficilis

Very common species in thicker shady and riparian habitats, particularly in the Riparian Forest.
Factor: 1.75
BREEDING: Confirmed FL(H3-2 being fed).

	A	B	C	D	E	F	G	H	I
1	10	2	12	28	8	20	11	50	9
2	12	6	26	18	7	11	23	31	6
3	_	_	28	13	5	15	11	36	9
Birds/mi.	10	7	19	16	4	12	7	22	16

BLACK PHOEBE Sayornis nigricans

Rather evenly distributed along the Carmel, esp. in the vicinity of appropriate nesting structures such as bridges. Factor: 1.25
BREEDING: Confirmed NY(I2-w/3 yng); NE(D3); FL(E3-being fed).

Date	A	B	C	D	E	F	G	H	I
1	1	1	2	3	13	2	9	4	7
2	3		4	3	6	5	7	7	6
3	_	_	6	5	7	9	3	8	1
Birds/mi.	1	1	3	3	4	4	3	3	7

ASH-THROATED FLYCATCHER Myiarchus cinerascens

A species of open woodlands and chaparral with only a few scattered, esp. near brushy sections, on the Carmel. Only calling males heard, so Factor: 2
BREEDING: Probable S(most dates, esp A2).

	A	B	C	D	E	F	G	H	I
1			1		3		2		1
2	3			3		2			
3	_	_	1	_	_	1	_	_	_
Birds/mi.	3		1	2	1	1	1		1

WESTERN KINGBIRD Tyrannus verticalis

A single bird seen near filter plant on 5 May was probably a migrant; they are not known to nest in Carmel Valley.

TREE SWALLOW Tachycineta bicolor

Scarce amonst the much more common Violet-green Swallow, and cruising range probably accounted for irregular detection. Factor: 1
BREEDING: Probable N(G1,3; F3 - investigating holes in dead trees).

Date	A	B	C	D	E	F	G	H	I
1					4	5	8	7	1
2			1		2	1	4		6
3	_	_	_	_	_	2	_	3	1
Birds/mi.			1		1	1	2	3	3

VIOLET-GREEN SWALLOW Tachycineta thalassina

A common widespread woodland swallow, though the wandering nature of flocks, sometimes large, skews distributional data. Factor: 1
BREEDING: Confirmed ON(G2,H3).

Date	A	B	C	D	E	F	G	H	I
1	4		8	31	24	27	15	23	10
2	12		5	10	97	45	16	39	4
3	_	_	8	18	19	24	7	38	5
Birds/mi.	4		3	10	17	14	5	11	7

NORTHERN ROUGH-WINGED SWALLOW Stelgidopteryx serripennis

Nesting of this species was previously unpublished for the Carmel River (Roberson 1985) but we found them locally distributed throughout, and confirmed nesting in both sandbanks and in manmade pipes on bridges. Factor: 1
BREEDING: Confirmed ON(A1; I1,3; F1,3; G1; H3).

Date	A	B	C	D	E	F	G	H	I
1	4			8	4	9	9	7	4
2	2		2	5	25	7	14	8	4
3	_	_	1	1	2	1	5	5	2
Birds/mi.	3		1	2	4	3	3	2	4

CLIFF SWALLOW Hirundo pyrrhonota

Locally common in the lower Valley, esp. at the large cliff nesting area just up from Robinson Canyon Bridge (@100-200 active nests). Wandering flocks elsewhere. Factor: 1, possibly underestimated.
BREEDING: Confirmed ON(F2,3); also nests on houses (F2).

Date	A	B	C	D	E	F	G	H	I
1				18	2	3	39		6
2					31	81	38	28	
3	_	_	1	1	11	103	1	4	1
Birds/mi.			1	4	6	33	13	5	4

BARN SWALLOW Hirundo rustica

Locally present, esp. near habitation in the lower Carmel. Factor: 1
BREEDING: Confirmed FL(C3).

Date	A	B	C	D	E	F	G	H	I
1			2	8	5	1	8	2	6
2				1	8	8	9		2
3	—	—	2	6	8	1	6	—	2
Birds/mi.			1	3	2	2	3	1	4

STELLER'S JAY Cyanocitta stelleri

A common and conspicuous species above and just below the reservoir, in the "montane" cool habitat (but only 500-650' elevation), rapidly becoming scarce downstream. Factor: 1
BREEDING: Confirmed FL(A2), FY(C2,3).

Date	A	B	C	D	E	F	G	H	I
1	5	2	7	4	6	6			
2	13	5	19	2	9	8	2	4	
3	—	—	15	7	3	7	1	1	—
Birds/mi.	5	4	7	2	2	3	1	1	

SCRUB JAY Aphelocoma coerulescens

The common jay of the warmer lower Carmel in more typical "upper Sonoran" zone habitat (Miller 1951). None were found above the dam. Factor: 1
BREEDING: Confirmed FL(H1,F3), FS(G3)

Date	A	B	C	D	E	F	G	H	I
1			3	20	14	6	16	19	1
2			2	9	22	8	17	18	2
3	—	—	2	10	29	16	15	23	3
Birds/mi.			1	6	7	5	3	6	2

AMERICAN CROW Corvus brachyrhynchos

Apparently feeds or moves along the river in numbers, but no nesting evidence obtained beyond Possible. The numbers at the river mouth are simply feeding flocks moving from beach to fields. Factor 1. BREEDING: Possible

Date	A	B	C	D	E	F	G	H	I
1			2	13	24	9	5		7
2			3	14	46	4	6	1	5
3	—	—	4	18	18	4	—	—	21
Birds/mi.			1	6	10	2	2	1	14

CHESTNUT-BACKED CHICKADEE Parus rufescens

A common species throughout the riparian, becoming more abundant in the Riparian Forest near the coast.
Factor: 1
BREEDING: Confirmed FL(K1, I2, C2, H2, D3, G3, H3- numerous family groups w/fledglings being fed; up to 9 sets of 2-4 young/each on the stretch H2).

Date	A	B	C	D	E	F	G	H	I
1	10	2	10	22	37	8	43	97	13
2	11	1	17	31	12	32	33	81	15
3	—	—	16	36	25	17	19	97	18
Birds/mi.	5	2	7	13	9	10	13	28	17

PLAIN TITMOUSE Parus inornatus

Occurs locally in residential areas and stands of large sycamores, though very common in adjacent oak woodland.
Factor: 1
BREEDING: Confirmed FL(D2, G2, F3)

Date	A	B	C	D	E	F	G	H	I
1					12		1		
2				8	10		1		
3	—	—	—	3	21	4	—	—	—
Birds/mi.				2	5	1	1		

BUSHTIT Psaltriparus minimus

Common in all riparian habitats, esp. so in the Riparian Forest area.
Factor: 1
BREEDING: Confirmed FL(I1, E2), FY(C2, F2).

Date	A	B	C	D	E	F	G	H	I
1	8	5	15	15	47	50	130	110	16
2	35		40	38	45	67	90	70	26
3	—	—	60	55	60	30	65	80	20
Birds/mi.	11	3	20	19	16	23	37	27	23

WHITE-BREASTED NUTHATCH Sitta carolinensis

Local and poorly detected in the vicinity of large oaks or sycamores only. Factor: 2
BREEDING: Probable S(all dates)

Date	A	B	C	D	E	F	G	H	I
1			1		2				
2				5					
3	—	—	—	—	—	—	—	—	—
Birds/mi.			1	2	1				

PYGMY NUTHATCH Sitta pygmaea

A resident of closed-cone forests, this species is restricted to the pines near the Hwy 1 bridge and near Carmel Valley golf course. Factor: 1.5
BREEDING: Probable T(all dates).

Date	A	B	C	D	E	F	G	H	I
1								1	1
2								2	6
3								2	2
	—	—	—	—	—	—	—	1	6
Birds/mi.									

BROWN CREEPER Certhia americana

A species of the "montane" forest, shaded woods above the dam on both the Carmel & San Clemente. Factor: 2
BREEDING: Probable S(all dates).

Date	A	B	C	D	E	F	G	H	I
1	2	1							
2	2	2							
3									
	—	—	—	—	—	—	—	—	—
Birds/mi.	2	3							

CANYON WREN Catherpes mexicanus

Singing bird in the canyon at the dam on 4 May and also two non-survey visits. Very likely nests here.

BEWICK'S WREN Thyromanes bewickii

A typical species of chaparral, but also in brushy spots along the river, particularly around Quail Lodge area. Factor: 1.75
BREEDING: Probable S(most dates).

Date	A	B	C	D	E	F	G	H	I
1					8	1	7	5	
2	3			5	2	3	4	16	
3			1	5	4		4	10	1
	—	—				—			
Birds/mi.	1		1	3	3	1	3	7	1

HOUSE WREN Troglodytes aedon

Most common in lush alder & brush in moist forest below the dam, but a few elsewhere in favored places. Factor: 1.5
BREEDING: Probable S(most dates).

Date	A	B	C	D	E	F	G	H	I
1	2		13	3	2		1		
2	15	1	19	8		3		1	1
3			14	1	6	1	3		3
	—	—						—	
Birds/mi.	6	1	10	3	2	1	1	1	3

AMERICAN DIPPER Cinclus mexicanus

A pair found feeding four fledged young along the Carmel just below San Clemente Dam is the first known nesting published for the Carmel (Roberson 1985). Single birds were recorded on each visit thereafter. Photographed.

BLUE-GRAY GNATCATCHER Polioptila caerulea

Recorded in chaparral above proposed inundation zone at the dam and above San Clemente Creek, where probable breeding documented.

WESTERN BLUEBIRD Sialia mexicana

A pair seen investigating holes in dead tree below the filter plant 5 May might have attempted to breed, but were not recorded thereafter. The species is not known to breed in the lower Carmel Valley, though does so commonly in oak woodlands just inland.

SWAINSON'S THRUSH Catharus ustulatus

A common species in the lower Carmel in thicker Riparian Forest habitat. Factor: 1.5
BREEDING: Probable S(most dates).

Date	A	B	C	D	E	F	G	H	I
1				1		1	7	20	4
2			1	5		7	2	35	7
3				1	1	4	9	37	8
	—	—	—						
Birds/mi.			1	1	1	3	4	15	11

AMERICAN ROBIN Turdus migratorius

Scattered widely, but seemingly prefers residential gardens and golf course edges. Factor: 1.25
BREEDING: Confirmed NY(I3- 3yng); FY(A2- also broken egg found).

Date	A	B	C	D	E	F	G	H	I
1			2	1	3		4	19	2
2	2			1		3	7	9	1
3			2			2	1	14	4
	—	—		—	—				
Birds/mi.	1		1	1	1	1	2	6	4

WRENTIT Chamaea fasciata

A characteristic species of chaparral, but also occurring in thickets in the riparian zone. Factor: 2
BREEDING: Probable S(all dates).

Date	A	B	C	D	E	F	G	H	I
1	2		3	3	9	3	14	4	2
2	7		10	5	6	9	10	4	2
3	—	—	7	6	10	5	7	1	1
Birds/mi.	5		9	4	5	6	8	2	4

CEDAR WAXWING Bombycilla cedrum

A nesting species of much farther north, these were simply opportunistic feeding flocks remaining from the winter. The data shows the pattern of departure in mid to late May.

Date	A	B	C	D	E	F	G	H	I
1					30	5	210	67	2
2							48	12	47
3									18

EUROPEAN STARLING Sturnus vulgaris

A despised introduced pest which usurps nesting holes of native species in dead trees, rather uniformly distributed in the lower Carmel but fortunately scarce above the dam. Factor: 1.
BREEDING: Confirmed FL & NY(F1, H1, I1, C2, E2- 40 fledglings, H2, D3), NB(G2).

Date	A	B	C	D	E	F	G	H	I
1			6	31	67	27	37	39	12
2	1		7	9	78	23	22	23	8
3	—	—	—	11	34	7	4	4	12
Birds/mi.	1		3	8	21	10	10	9	12

HUTTON'S VIREO Vireo huttoni

A characteristic species of mixed live oak/pine woods, and recorded in such habitat where it abuts the river, but also a few in the mixed lower riparian zones. Factor: 1.75
BREEDING: Probable S(most dates).

Date	A	B	C	D	E	F	G	H	I
1			5		2	1	3	2	1
2	3			3	1	4	2	3	1
3	—	—	7	4	4	1	—	2	—
Birds/mi.	3		4	2	2	2	1	1	2

WARBLING VIREO Vireo gilvus

A species rather restricted to the Riparian Forest/Woodland/Thicket, becoming a bit more common in the lower Carmel. Factor: 1.5
BREEDING: Confirmed FL(G2).

Date	A	B	C	D	E	F	G	H	I
1	2		9	5	16	15	16	24	
2	9		14	7	10	15	19	34	4
3	—	—	16	15	12	19	16	28	7
	4		9	6	6	10	9	13	8

ORANGE-CROWNED WARBLER Vermivora celata

Rather uniformly distributed in the riparian and oak woodland edge, where there is a brushy understory.
Factor: 1.5
BREEDING: Confirmed FL(G2- being fed).

Date	A	B	C	D	E	F	G	H	I
1	6	1	12	18	28	12	21	16	
2	16	1	33	22	25	15	14	31	
3	—	—	23	23	27	21	9	13	—
Birds/mi.	8	2	17	17	12	10	9	10	

YELLOW WARBLER Dendroica petechia

A riparian specialist that has been impacted statewide by habitat destruction and parasitism by cowbirds, the populations on the lower Carmel are quite healthy, and suggest a comparatively healthy ecosystem in the riparian zone. Factor: 1.5
BREEDING: Probable S(all dates).

Date	A	B	C	D	E	F	G	H	I
1			5	32	14	30	15	25	6
2			12	21	33	22	22	21	5
3	—	—	8	23	16	16	12	17	15
Birds/mi.			6	17	11	16	9	10	16

TOWNSEND'S WARBLER Dendroica townsendi

Two late migrants, female-plumaged, were encountered: Quail Lodge area on 12 May and (very late) near Robinson Canyon 19 May.

BLACK-THROATED GRAY WARBLER Dendroica nigrescens

	A	B	C	D	E	F	G	H	I
1	3		3						
2	4		1			1			
3			1	1					
Birds/mi.	4		2	1		1			

A nesting species more usual at higher elevations, it was recorded in the Mixed Evergreen Forest above and below the dam, with a couple individuals singing down as far as Garland Ranch. Factor: 2
BREEDING: Probable S(all dates).

MacGILLIVRAY'S WARBLER Oporornis tolmiei

A persistently singing male about 2 miles above the reservoir on the Carmel on 4 May suggested nesting in the appropriate appearing alder/thicket woodland, but not recorded thereafter. There are few Monterey County nesting areas (Roberson 1985) but the site resembled typical breeding habitat.

COMMON YELLOWTHROAT Geothypis trichas

A young singing male at the pond below "Cross Hill" at the river mouth was on apparently appropriate breeding habitat 15 May, but not found thereafter, so might have been a migrant. The species does occasionally nest at the Carmel River mouth.

WILSON'S WARBLER Wilsonia pusilla

Date	A	B	C	D	E	F	G	H	I
1	1		4		3		3	21	2
2	1		1	2		5		42	6
3			2	2	5	3	7	10	9
Birds/mi.	1		2	1	2	2	3	14	8

Thinly distributed in all riparian zones, but with a population center in the Riparian Forest of the lower Carmel. Factor: 1.75
BREEDING: Probable S(all dates).

YELLOW-BREASTED CHAT Icteria virens

Date	A	B	C	D	E	F	G	H	I
1				1	1				
2					1		1		
3					1				
Birds/mi.				1	1		1		

A riparian specialist declining statewide (Remsen 1977), this species thought to be absent from the Carmel since 1960 (when 8 males found; Roberson 1985). We found an apparent three pairs remaining. Factor: 2
BREEDING: Confirmed FY(E2).

WESTERN TANAGER Piranga ludoviciana

Date	A	B	C	D	E	F	G	H	I
1	4			5					
2	3								
3									1

A breeding species of the yellow pine forest zone in the Santa Lucia Mnts., all our birds were thought to be migrants (so no "birds/mi. calculated).
It is possible, though, that nesting could occur on the upper Carmel down to the reservoir

BLACK-HEADED GROSBEAK Pheucticus melanocephalus

	A	B	C	D	E	F	G	H	I
1	12	1	14	1	9	5	16	14	3
2	10		8	9	3	9	16	21	2
3			11	7	8	4	6	17	2
Birds/mi.	8	1	8	5	4	4	8	8	4

Evenly distributed along the entire Carmel, preferring areas with taller trees. Factor: 1.5
BREEDING: Confirmed NE(H1), FY(A2).

LAZULI BUNTING Passerina amoena

Date	A	B	C	D	E	F	G	H	I
1	2		2		1		2		
2	2								1
3									
Birds/mi.	2		1		1		1		1

A bird of scrubby patches, often adjacent to chaparral, and not in the riparian zone; Birds were recorded only in adjacent hillsides; it is probable the lower Carmel individuals were simply migrants. Factor: 2
BREEDING: Probable S(A1,2; C1- suggested nesting only).

RUFOUS-SIDED TOWHEE *Pipilo erythrophthalmus*

		A	B	C	D	E	F	G	H	I
	1	1		1		12	2	7		
	2	6		10	5	10	2	3	2	
	3	_	_	9	13	11	3	1	5	_
Birds/mi.		3		7	6	6	2	3	2	

A species of chaparral adjacent to the riparian and thick brush in the riparian zone, commonest the first few stretches below the dam.
Factor: 1.75
BREEDING: Confirmed FY(A2).

BROWN TOWHEE *Pipilo fuscus*

Date	A	B	C	D	E	F	G	H	I
1			2	1		6	3	12	2
2				2	3	3	6	14	
3	_	_	6	9	8	1	8	21	4
Birds/mi.			2	3	2	2	3	6	4

A brush-loving species becoming gradually more common towards the coast. Factor: 1.25
BREEDING: Probable T(H1), S(most date)

RUFOUS-CROWNED SPARROW *Aimophila ruficeps*

Singing male in brushy, rocky chaparral on slope above dam 5 May stronly suggests breeding here in this appropriate-appearing habitat.

SONG SPARROW *Melospiza melodia*

Date	A	B	C	D	E	F	G	H	I
1	2		11	30	81	45	60	80	16
2	9		22	46	57	47	48	77	23
3	_	_	26	26	66	43	24	53	34
Birds/mi.	4		14	23	32	28	27	34	38

The commonest species on the Carmel in the riparian brush, population becoming denser closer to the coast.
Factor: 1.5
BREEDING: Confirmed FL(D1, D2, E2, F2, D3, F3).

WHITE-CROWNED SPARROW *Zonotrichia leucophyrs*

	A	B	C	D	E	F	G	H	I
1									5
2									5
3	_	_	_	_	_	_	_	_	6
Birds/mi.									6

Virtually restricted to the coastal scrub on "Cross Hill" at the river mouth, but one was singing upstream one mile at the Hwy 1 bridge.
Factor: 1.25 BREEDING: Probable S(all dates).

DARK-EYED JUNCO *Junco hyemalis*

Date	A	B	C	D	E	F	G	H	I
1	3		4	3					
2	4		16	8	2	2			
3	_	_	20	1	2	2	_	_	_
Birds/mi.	3		10	3	1	1			

A species of montane and cool forests, found in numbers only in the shady forest below the dam and rapidly declining downstream as habitat disappears. Factor: 1.5
BREEDING: Confirmed FL(C2, D2, E2, F3- 4 young).

RED-WINGED BLACKBIRD *Agelaius phoeniceus*

	A	B	C	D	E	F	G	H	I
1			2	1	53	15	20	6	16
2	3			3	38	17	10	6	20
3					40	43	5	5	10
Birds/mi.	2		1	1	13	12	5	2	18

Locally common at the scattered breeding ponds in tules, feeding birds elsewhere. Factor: 1
BREEDING: Confirmed NE(E1), FL(E2), FY(I3).

BREWER'S BLACKBIRD *Euphagus cyanocephalus*

	A	B	C	D	E	F	G	H	I
1				20	3[illegible]	9	75	25	16
2				[illegible]	34	25	166	28	29
3				4	63	36	195	18	1[illegible]
Birds/mi				[illegible]	20	12	60	8	22

Common in the lower Carmel, nesting in the riparian and feeding in open fields. A large roost at Robinson Canyon accounts for the totals in stretch G. Factor 1
BREEDING: Confirmed FL(I1-being fed, E2, I3, I4

BROWN-HEADED COWBIRD *Molothrus ater*

Date	A	B	C	D	E	F	G	H	I
1			1	[illegible]	[illegible]		12	26	5
2			[illegible]	[illegible]	[illegible]	10	13	32	9
3			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	15	8
Birds/mi			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17	17

High densities in the riparian zone near the mouth, but fewer upstream may be balanced in the ecosystem
Factor: 1.75 BREEDING: Confirmed DD(I1 copulation

NORTHERN ORIOLE Icterus galbula	Date	A	B	C	D	E	F	G	H	I
	1					3	2	5		
Restricted to large oaks/sycamores and mixed stands with eucalyptus.	2						1	3	1	
Factor: 1.5	3	_	_	_	1	_	2	_	_	_
BREEDING: Probable S(most dates).	Birds/mi.				1	1	1	2	1	

PURPLE FINCH Carpodacus purpureus	Date	A	B	C	D	E	F	G	H	I
	1			1	3	14	3	26	13	
Throughout the riparian of the lower Carmel, but commonest in the Riparian Forest nearer the mouth.	2	3			8	11	9	17	26	7
	3	_	_	4	4	13	7	6	24	5
Factor: 1.75	Birds/mi.	1		2	4	7	6	13	13	11
BREEDING: Confirmed NB(H3), FS(H3).										

HOUSE FINCH Carpodacus mexicanus	Date	A	B	C	D	E	F	G	H	I
	1				1	3	4	13	10	28
Common in open areas in the lower Carmel, using the riparian only to feed (probably). Numbers at the mouth are feeding flocks, not high nesting densities. Factor: 1.25	2				3	6	8	23	42	27
	3	_	_	_	_	13	4	10	8	7
	Birds/mi.				1	4	3	7	9	34
BREEDING: Probable S(most dates).										

PINE SISKIN Carduelis pinus	Date	A	B	C	D	E	F	G	H	I
	1							2		
Restricted to mixed pine/riparian habitats, or eucalyptus, near the river mouth. Factor: 1	2							2	8	1
	3	_	_	_	_	_	_	_	2	4
BREEDING: Possible	Birds/mi.							1	1	3

LESSER GOLDFINCH Carduelis psaltria	Date	A	B	C	D	E	F	G	H	I
	1	4		2	11	14	24	12	15	8
Rather evenly distributed throughout in the riparian zone. Factor: 1	2	6		5	14	6	7	19	18	
	3	_	_	24	10	20	16	11	22	10
BREEDING: Confirmed NE(F1-4 eggs, later NY-4 yng F3), NE(F3-another), NB(I1).	Birds/mi.	3		5	5	5	8	5	6	9

LAWRENCE'S GOLDFINCH Carduelis lawrencei		A	B	C	D	E	F	G	H	I
	1							4	5	
Only previously suspected as nesting at the river mouth once before (in 1981-Roberson 1985), we found pairs and proved nesting this year, which may be anomolous. Factor: 1	2				1			7	2	2
	3	_	_	_	_	_	_	_	7	3
	Birds/mi.				1			2	2	2
BREEDING: Confirmed NB(I3), probable FL(J3-with another pair).										

AMERICAN GOLDFINCH Carduelis tristis	Date	A	B	C	D	E	F	G	H	I
	1									1
Restricted to the immediate vicinity of the coast, using riparian of river mouth for feeding, but may not nest in that habitat. Factor: 1	2								3	1
	3	_	_	_	_	_	_	_	_	1
	Birds/mi.								1	1
BREEDING: Possible										

HOUSE SPARROW Passer domesticus	Date	A	B	C	D	E	F	G	H	I
	1						1		1	1
A denizen of human habitation, esp. around shopping centers, BREEDING: Confirmed NB(H3) at Rio Road shopping center adjacent (but not in) riparian	2								1	
	3								1	

Acknowledgements: Henrietta Stern was very helpful in many ways, including obtaining permission for access to private property above and below the dam. Graham Matthews drove us to all the access points prior to the survey and did the bulk of the aerial mapping, which we confirmed in our walks. Rick Villasenor helped with the mapping, prepared the habitat descriptions (Table 1) and supervised the entire project.

LITERATURE CITED

Dettman, D.H. 1986. Relationship between steelhead sport catch angling success and streamflows in the Carmel River during 1984. Appendix F to Assessment of Carmel River steelhead resource: its relationship to streamflow and to water supply alternatives. Unpublished; prepared for the Monterey Pen. Water Management District in cooperation with the Carmel River Steelhead Ass'n.

Dettman, D.H. and D.W. Kelley. 1986. Assessment of the Carmel River steelhead resource, Vol. I: Biological Investigations. Unpublish; prepared for the Monterey Pen. Water Management District.

Gaines, D. and S.A. Laymon. 1984. Decline, status and preservation of the Yellow-billed Cuckoo in California. West. Birds 15:49-80.

Goldwasser, S., D. Gaines, and S.R. Wilbur. 1980. The Least Bell's Vireo in California: a de facto endangered race. Am. Birds 34:742-745.

Grinnell, J. and A.H. Miller. 1944. The distribution of the birds of California. Pac. Coast Avifauna No. 27.

Hays, L.R. 1986. The status and management of the Least Bell's Vireo within the Prado Basin, California, during 1986. Upublished; prepared for the Calif. Dept. of Transportation, San Bernardino, Calif.

Jones, B. 1985. A report on the status of the Least Bell's Vireo on the San Diego, Sweetwater and San Luis Rey Rivers, San Diego County, Calif. Unpublished.

Lehman, P. 1982. The status and distribution of the birds of Santa Barbara County, Calif. Unpublished master's thesis, U.C. Santa Barbara.

Miller, A.H. 1951. An analysis of the distribution of the birds of California. Univ. of Calif. publications in zoology, Vol. 50, No. 6, pp 531-644.

Remsen, J.V. 1977. The species of special concern list: an annotated list of declining or vulnerable species of birds in California. Unpublished; prepared for Western Field Ornithologists and the Calif. Dept. of Fish & Game.

Robbins, C.S., D. Bystrak, and P.H. Geissler. 1986. The breeding bird survey: its first fifteen years, 1965-1979. U.S. Fish & Wildlife Serv., resource publ. 157.

Roberson, D. 1985. Monterey birds. Carmel: Monterey Pen. Audubon Society.

Salata, LR. 1987. The status of the Least Bell's Vireo at Camp Pendleton, Calif., in 1986. Unpublished; prepared for the U.S. Marine Corp. in association with Sweetwater Environmental Biologists, Spring Valley, Calif.

Small, A. 1974. The birds of California. New York: Winchester Press.

U.S. Fish & Wildlife Service. 1986. Least Bell's Vireo Management Plan. Unpublished draft, Portland, Oregon.

Williams, L. 1974. List of the birds of the Monterey Peninsula region. Carmel: Monterey Pen. Audubon Society.

Table 1

RIPARIAN HABITAT CLASSIFICATIONS

1. Surface Water (Aquatic): Pools and River bed.

2. Emergent Vegetation: Annual and perennial herbs occupying permanently wet habitats in the River as well as pools, springs or seeps. Typical species are: Carex spp. (Sedge), Juncus spp. (Rush) Typha latifola (Cat-Tail), Scirpus spp. (Bulrush or Tule) and Equisetum spp (horsetail).

3. Dry Wash: Low annual herbs and grasses that occur in scoured or rocky substrate areas. Often the habitat is covered with mats of dried algae. Common and characteristic plant species include: Brassica spp. (Mustards), Heliotropidum currassivicum (Chinese Pusley), Lactuca scariola (Willow Lettuce), Melilotus albus (White Sweet Clover), Paspalum districhum (Knotgrass), Polypogon monspeliensis (Rabbitfoot Grass), Rumex crispus (Curly Dock), Xanthium spp. (Cocklebur).

4. Riparian Scrub: Dominated by various shrubs and herbs that occupy gravel and point bars and lacks a well-established tree canopy. Scrub consists of low (2-10 feet) shrubs in rocky open areas. Common and characteristic plant species of riparian scrub include: Artemisia douglasiana (Mugwort), Baccharis piluraris (Coyote Bush), Rubus vitifolius (Blackberry), Foeniculum vulgare (Sweet Fennel), Toxicodendron diversilobum (Poison Oak) and Rhamnus californica (Coffeeberry).

5. Northern Riparian Woodland/Thicket: A woodland is dominated by large (30-60 feet high), deciduous trees that occur in a range of densities. Open, scattered trees represent a woodland. The understory also varies from bare ground (due to scouring or poor light penetration) to a dense herb and/or scrub thicket. This habitat type may be divided into associations based upon the dominant tree species. Common and typical tree species include: Cottonwoods (Populus trichocarpa), Willows (Salix spp.), Sycamores (Platanus racemosa) and Alders (Alnus rhombifolia).

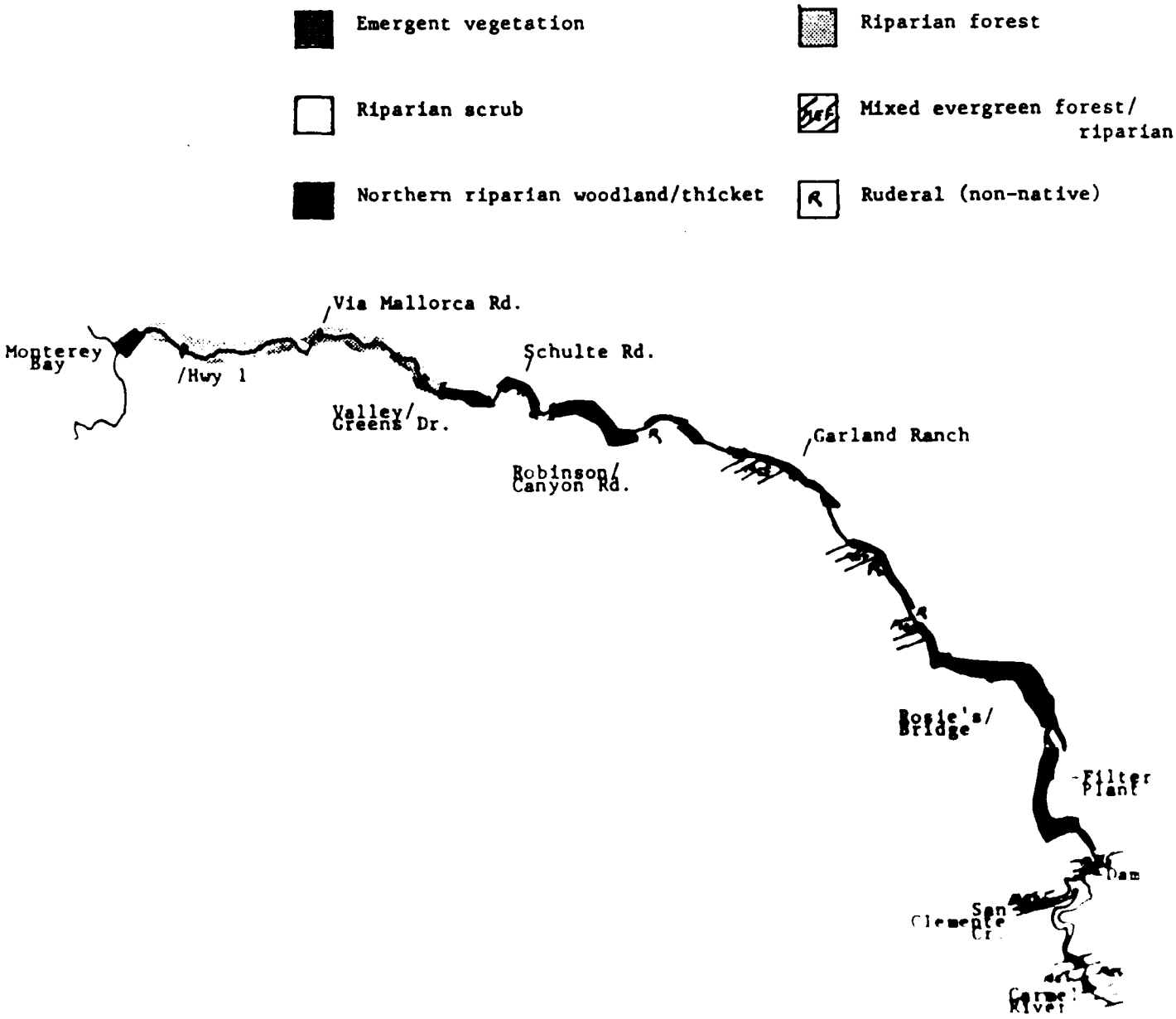
A thicket is a dense stand of woody riparian vegetation less than 20 feet in height and is usually dominated by a single species. There is a continuum of size and structural complexity between these two extremes. Common and characteristic plant species of riparian thickets include: Salix lasiandra (Yellow Willow), S. hindsiana (Sandbar Willow), S. laevigata (Red Willow) and Cornus stoloniferous (Dogwood).

6. Riparian Forest: Dominated by large (30-60 feet high), deciduous trees with overlapping canopies. The understory also varies from bare ground (due to scouring or poor light penetration) to a dense herb and/or scrub thicket. This habitat type may be divided into associations based upon the dominant tree species. Common and typical tree species include: Cottonwoods (Populus trichocarpa), Willows (Salix spp.), Sycamores (Platanus racemosa) and Alders (Alnus rhombifolia).

7. Mixed Evergreen Forest/Riparian: In the steep canyon and gorge areas where the river bottom is right next to the adjacent canyon slopes, the riverside vegetation is dominated by oaks (Quercus agrifolia), bay (Umbellularia californica), and California Buckeye (Aesculus californicus). The understory is often characterized by a dense stand of poison oak, wild currert (Ribes sp.), coffeeberry and blackberry.

8. Ruderal or Non-Native Communities: Areas along the river that have been disturbed or planted with non-native plant species. Examples would be Eucalyptus groves, grass covered banks, or rock rip-rap areas.

Map 1: Generalized habitats on the Carmel River (width of habitats exaggerated)
Definitions of habitats in table 1



CRITERIA FOR POSSIBLE, PROBABLE AND CONFIRMED BREEDING

POSSIBLE BREEDING - this code should be entered in the first column of the Atlas Card (PO).

✓ Bird recorded in the breeding season in possible nesting habitat but no other indication of breeding noted. Take 1 May through 31 July as the breeding season for most species. Summering, non-breeding adults such as gulls in a dump when you know there is no gullery in your block, migrant shorebirds and warblers, should NOT be included.

PROBABLE BREEDING - codes entered in second column (PR).

S Singing male present (or breeding calls heard) on more than one date in the same place. It is a good indication that a bird has taken up residence if the dates are a week or more apart.

T Bird (or pair) apparently holding territory. In addition to singing, chasing of others of the same species often marks territory.

D Courtship and display; or agitated behavior or anxiety calls from adults, suggesting probable presence of nest or young nearby; brood-patch on trapped female or cloacal protuberance on trapped male.

N Visiting probable nest-site.

B Nest building by wrens and woodpeckers. Wrens may build many nests and woodpeckers, although they usually drill only one nesting cavity, may also drill roosting holes.

CONFIRMED BREEDING - codes entered in third column (CO).

DD Distraction display or injury feigning, coition. Agitated behavior and/or anxiety calls are "D" only.

NB Nest building by any species except wrens and woodpeckers.

UN Used nest found. These must be carefully identified if they are to be used. Some nests (like Northern Oriole) are persistent and very characteristic. Others are more difficult to identify correctly.

FE Female with egg in the oviduct.

FL Recently fledged young (including downy young of waterfowl etc.). This code should be used with caution for species such as Starlings and swallows which may move some distance soon after fledging. Recently fledged passerines are still dependent on parents and being fed by them.

FS Adult carrying fecal sac.

FY Adult(s) with food for young. Some birds (gulls, terns and birds of prey) continue to feed their young long after they've fledged and may move considerable distances. Also some bird (like terns) may carry food long distances to young in a neighboring block. Be careful especially on the edge of a block. Care should be taken to avoid confusion with courtship feeding (D).

ON Adult(s) entering or leaving nest-site in circumstances indicating occupied nest. Not generally used for open nesting birds. The correct code would be "N" if you simply see a bird fly into or out of a bush or tree and do not find the nest. It should be used for hole nesters as when a bird enters a hole and remains inside, changes over at a hole or bird leaves hole after having been inside for some time.

NE Nest and eggs or bird setting and not disturbed or egg shells found below the nest. If you find a cowbird egg in a nest, it's NE for cowbird and NE for the host nest.

NY Nest with young or downy young or downy young of waterfowl, quail, waders, etc. If you find a young cowbird with the other young, it's NY for the cowbird and NY for the host species. Since parents often lead down young for considerable distances, care should be taken if such records are close to the edge of the block.

APPENDIX C2

Bird List

APPENDIX C2

BIRD LIST[1]

Chestnut-Backed Chickadee
Common Bushtit
Pygmy Nuthatch
Wrentit
House Wren
Bewick Wren
Robin
Swainson Thrush
Ruby-Crowned Kinglet
Starling
Hutton Vireo
Warbling Vireo
Orange-Crowned Warbler
Yellow Warbler
Wilson Warbler
English Sparrow
Red-Winged Blackbird
Brewer Blackbird
Western Tanager
Black-Headed Grosbeak
House Finch
American Goldfinch
Lesser Goldfinch
Rufous-Sided Towhee
Brown Towhee
Dark-Eyed Junco
Song Sparrow
Sharp-Skinned Hawk
Osprey
Great Egret
Green-Backed Heron
Black-Crowned Night-Heron

Bird List cont'd

Canada Goose
Cinnamon Teal
Black-Throated Grey Warbler
Cedar Waxwing
Townsend's Warbler
American Dipper
Mountain Quail
Virginia Rail
Greater Yellowlegs
Spotted Sandpiper
Brown Creeper
Blue-Gray Gnatcatcher
Least Sandpiper
Great Horned Owl
Northern Pygmy-Owl
Long-Eared Owl
Canyon Wren
Western Bluebird
Western Kingbird
Cliff Swallow
Plain Titmouse
White-Breasted Nuthatch
MacGillivray's Warbler
Common Yellowthroat
Yellow-Breasted Chat
Lazuli Bunting
White-Crowned Sparrow
Brown-Headed Cowbird
Northern Oriole
Purple Finch
Pine Siskin
Lawrence's Goldfinch
Great Blue Heron

Bird List cont'd

Mallard
Common Merganser
Turkey Vulture
White-Tailed Kite
Cooper Hawk
Red-Tailed Hawk
Red-Shouldered Hawk
Kestral
California Quail
Killdeer
Band-Tailed Pigeon
Mourning Dove
White-Throated Swift
Anna Hummingbird
Allen Hummingbird
Rufous Hummingbird
Belted Kingfisher
Common Flicker
Acorn Woodpecker
Hairy Woodpecker
Downey Woodpecker
Nuttall Woodpecker
Ash-Throated Flycatcher
Black Phoebe
Western Flycatcher
Western Wood Pewee
Olive-Sided Flycatcher
Violet-Green Swallow
Tree Swallow
Rough-Winged Swallow
Barn Swallow
Steller Jay
Scrub Jay

Bird List cont'd

Crow

Golden Eagle

---

[1]This list is a combination of two surveys of the riparian zone along the Carmel River by MPWMD in 1983 and by Don and Robin Roberson in 1987.

APPENDIX C3

Reptile and Amphibian List

APPENDIX C3

REPTILE AND AMPHIBIAN LIST[1]

Western pond turtle (Clemmys marmorata)
*Common garter snake (Thamnophis sirtalis)
Western aquatic garter snake (Thamnophis couchi)
Western skink (Eumeces skiltonianus)
Northern alligator lizard (Gerrhonotus coeruleus)
Ringneck snake (Diadophis punctatus)
Sharp-tailed snake (Contia tenuis)
Western terrestrial garter snake (Thamnophis elegans)
*Western fence lizard (Sceloporus occidentalis)
*Southern alligator lizard (Gerrhonotus multicarinatus)
California legless lizard (Anniella pulchra)
Rubber boa (Charina bottae)
Racer (Colubes constrictor)
Striped racer (Masticophis laterialis)
*Gopher snake (Pituophis melanoleucus)
Common kingsnake (Lampropeltis getulus)
*Western rattlesnake (Crotalus viridis)
*Side blotched lizard (Uta stansburiana)
Red-legged frog (Rana aurora)
*Foothill yellow-legged frog (Rana boylei)
*Bullfrog (Rana catesbeana)
California newt (Taricha torosa)
Western toad (Bufo boreas)
*Pacific treefrog (Hyla regilla)
Ensatina (Ensatina eschscholtzi)
California slender salamander (Batracoseps attenuatus)
Arboreal salamander (Aneides lugubris)

---

[1] Monterey Peninsula Water Management District, 1983. Riparian Mammals and Herptofauna of Carmel Valley.

* Species observed during the field surveys.

APPENDIX C4

Mammal List

APPENDIX C4

MAMMAL LIST[1]

Little brown myotis (Myotis lucifungus)

Yuma myotis (Myotis yumanensis)

Long-eared myotis (Myotis evotis)

Fringe-tailed myotis (Myotis thysanodes)

Hairy-winged bat (Myotis volans)

California myotis (Myotis californicus)

Small-footed myotis (Myotis subulatus)

Big brown bat (Eptesicus fuscus)

Red bat (lasiurus borealis)

Hoary bat (Lasiurus cinereus)

Lump-nosed bat (Plecotus townsendii)

Pallid bat (Antrozous pallidus)

Mexican free-tailed bat (Tadarida brasiliensis)

Raccoon (Procyon lotor)

Ring-tailed cat (Bassariscus astutus)

Long-tailed weasel (Mustela frenata)

Spotted skunk (Spilogale gracilis)

Striped skunk (Mephitis mephitis)

Badger (Taxidea taxus)

Grey fox (Urocyon cinereoargenteus)

Coyote (Canis lantrans)

Mountain lion (Felis concolor)

Bobcat (Lynx rufus)

Beechey ground squirrel (Spermophilus beecheyi)

Western grey squirrel (Sciurus griseus)

Botta pocket gopher (Thomomys bottae)

Western harvest mouse (Reithrodontomys megalotis)

Deer mouse (Peromyscus maniculatus)

California white-footed mouse (Peromyscus californicus)

Dusky-footed wood rat (Neotoma fuscipes)

California meadow mouse ((Microtus californicus)

Norway rat (Rattus norvegicus)

Mammal List cont'd

Black rat (Rattus rattus)

House mouse (Mus musculus)

Merriam chipmunk (Eutamias merriami)

California pocket mouse (Perognathus californicus)

Heerman kangaroo rat (Dipodomys heermani)

Graceful kangaroo rat (Dipodomys venustus)

Brush mouse (Peromyscus boylei)

Pinyon mouse (Peromyscus truei)

Audubon rabbit (Sylvilagus auduboni)

Brush rabbit (Sylvilagus bachmani)

Black-tailed hare (Lepus californicus)

Wild pig (Sus scrofa)

Mule deer (Odocoileus hemionus)

Shrews (Surex spp.)

---

[1]Monterey Peninsula Water Management District, October 1983. Riparian Mammals and Herptofauna of Carmel Valley.

APPENDIX C5

Plant List

APPENDIX C5

PLANT SPECIES LIST

Plants

*Ceanothus dentatus (Cropleaf Ceanothus) CC, SC

*Ceanothus sorediatus (Jim Brush) ME

Ceanothus thyrisiflorus var. griseus (Blue Blossom) ME

*Alnus rhombifolia (White Alder) R

*Prunus ilicifolia (Hollyleaf Cherry) ME, SC

*Rubus vitifolius (California Blackberry) ME, R

*Rosa californica (Wild Rose) R

*Pellaea andromedaefolia (Coffee Fern) ME, R

*Mimulus aurantiacus (Northern Monkeyflower) C, OW, ME

*Zigadenus fremontii (Star-Lily) - G, ME

Pteridium aeuilina pubescens (Western Bracken) ME, OW

*Populus trichocarpa (Black Cottonwood) - R

*Qercus agrifolia (California Live Oak) - ME, OW

*Qercus wislizenii (Interior Live Oak) - ME, OW

*Ribes speciosum (Fushsia Gooseberry) - OW

*Adenostema fasciculatum (Chamise) - CC

*Heteromeles arbutifolia (Christmas Berry) - SC

*Toxicodendron diversiloba (Poison Oak) - OW, R, ME, SC

*Aesculus californica (California Buckeye) - ME, R

*Arbutus menziesii (Madrone) - ME

*Eriodictyon californicum (Yerba Santa) - SC, U

*Salvia mellifera (Black Sage) - SC, CC, OW

*Artemisia californica (California Sagebrush) - SC

Rumex crispus (Curly Dock) - R

*Montia perfoliata (Miner's Lettuce) - ME, OW, R

*Stachys bullata (Hedge Nettle) - R, OW, ME

*Madia elegans ssp. Vernalis (Common Madia) - ME, OW, G

*Madia sativa (Wild Madia) - ME, OW, G, SC

*Dodecatheon clevlandii ssp. Sanctarum (Clevland's Shooting Star) - G, OW

*Escholtzia californica (California Poppy) - G

*Capsella bursa-pastoris (Shepherd's Purse) - G

*Dodecatheon hendersonii (Henderson's Shooting Star) - G

*Ma[illegible] (Common Horehound) OW, ME, R

[illegible] (California Wood Fern) OW, ME

[illegible] (Sword Fern) OW, ME

[illegible] (Chain Fern) OW, ME

*Seq[illegible] (Coast Redwood) ME

*[illegible] (Western Sycamore) R

*[illegible] (Spring Vetch)

*[illegible] (Slender Vetch)

*Trifolium tridentatum (Tomcat Clover) G

*Umbellularia californica (California Bay) ME, R

*Clematis [illegible]nia (Virgin's Bower) R, ME

*Ranunculus californicus (California Buttercup) OW, ME, G

*Geranium [illegible]

*Viola pedunculata (Wild Pansy) G, OW

*Platystemon californicus (Cream Cups) G

Athysanus pusillus (Sandweed) - R

Chenopodium ambrosioides var. vagans (Mexican-tea)

*Nemophila menziesii (Baby Blue-eyes) G, OW

Phacelia nemoralis (Shade Phacelia) - OW, ME

*Pholistoma auritum (Fiesta-flower) - R, OW, ME, G

Amsinckia intermedia (Common Fiddleneck) - G

Cryptantha rattanii - G, OW

Plagiobothrys nothofulvus (Popcorn Flower) - G

Solanum umbelliferum (Blue Witch) - CC, SC, ME

*Clarkia purpurea (Purple Clarkia) - CC

*Helenium puberulum (Sneezeweed) - R

*Ribes speciosum (Fuschia-flowered Gooseberry) - ME, OW

*Lasthenia chrysostoma ssp. gracilis (Goldfields) - OW, G

Collinsia heterophylla (Chinese House)

Veronica comosa (Speedwell) - R

Satureja mimuloides - CC, R

*Scutellaria tuberosa (Danny's Skull-cap) - C

Stachys pycnantha (Short-spiked Hedge Nettle) - ME, R

Plant Species List

Trichostema lanceolatum (Vinegar Weed) G, C
Ribes divaricatum (Straggly Gooseberry) ME, R
*Saxifraga californica (California Saxifraga) SC, CC
Lotus grandiflorus var. mutabilis (Chaparral Lotus) CC
Lotus scoparius (Deer Weed) SC, CC
Lotus strigosus (Bishop Lotus)
Lotus subpinnatus (California Lotus)
*Lupinus bicolor SC, ME
Lupinus densiflorus (Gully Lupine) ME, G
Lupinus hirsutissimus (Stinging Lupine) CC, SC
Lupinus micranthus (Field Lupine) ME
Lupinus nanus (Sky Lupine) G
Lupinus succulentus (Succulent Annual Lupine) - G
Psorelea physodes (California Tea) - CC
Trifolium microcephalum (Maiden Clover) - G
*Galium angustifolium (Narrow-leaved Bedstraw) - ME, OW
Galium aparine (Goose Grass) - ME, R
*Galium californicum (California Bedstraw) - ME
*Lonicera interrupta (Chaparral Honeysuckle) - CC, SC
*Sambucus mexicana (Blue Elderberry) - ME
Symphoricarpus rivularis (Common Snowberry) - ME, OW
*Maram fabaceus (Common Manroot) - CC, SC, ME
*Dentaria californica (California Milkmaids) - ME, OW
*Cynoglossum grande (Hounds Tongue) - ME, OW
*Pedicularis densiflora (Indian Warrior) - ME, OW
*Clarkia williamsonii (Williamson's Clarkia) - G, CC, SC
*Collinsia bartsiaefolia (Chinese Houses) - ME, OW
*Castilleja foliolosa (Paint Brush) - ME, OW
Achillea borealis ssp. californica (Yarrow) - G
*Baccharis pilularis var. consanguinea (Coyote Brush) - SC, ME
Centaurea melitensis (Tocalote) - G, CC, SC
Cirsium brevistylum (Indian Thistle) - ME, SC
Cirsium vulgare (Bull Thistle)

Plant Species List

Corethrogyne filaginifolia (Common Corethrogyne) - CC, SC
*Eriophyllum confertiflorum (Golden Yarrow) - CC, SC
*Gnaphalium californicum (California Everlasting) - CC, SC
Gnaphalium luteo-album (Weedy Cudweed)
*Gnaphalium microcephalum (White Everlasting) - SC, CC
Heterotheca grandiflora (Telegraph Weed)
*Hypochoeris glabra (Smooth Cat's Ear) - G
Rafinesquia californica (California Chicory) - CC, SC
Senecio douglasii (Shrubby Butterweed) - R, CC, SC, G
Solidago californica (Common Goldenrod) - SC
Solidago occidentalis (Western Goldenrod) - SC, R, G
Sonchus asper (Prickly Sow-thistle)
*Calochortus albus (White Globe Lily) - G
*Calochortus luteus (Yellow Mariposa) - G
Calochortus splendens (Lilac Mariposa) - G, ME, OW
Smilacina stellata var sessilifolia (Slim Solomon) - R, ME, CC
*Zigadenus fremontii (Star-lily) - G, ME, CC
*Yucca whipplei ssp. percursa (Our Lord's Candle) - CC, SC
*Brodiaea coronaria var macropoda (Dwarf Brodiaea) - G, OW
*Brodiaea lutea (Golden Brodiaea) - R
*Brodiaea pulchella (Blue Dicks) - G, OW
*Sisyrinchium bellum (Blue-eyed Grass) - G, OW
*Platystemon californicus (Cream Cups) - G
*Thysanocarpus curipes (Fringe Pod) - G
*Thlaspi arvense (Penny-cress) - R, G
*Orthocarpus purpurascens (Purple Owl's Clover) - CC
Carex alma - SC
*Carex nudata - R
*Avena fatua (Wild Oat) - G
Cornus occidentalis (Western Creek Dogwood) - R
Quercus douglasii (Blue Oak) - OW, ME
Quercus lobata (Valley Oak) - OW, ME
*Salix laevigata var. Araquipa (Red Willow) - R

Plant Species List

*Salix lasiolepis (Arroyo Willow) - R
*Urtica holosericea (Hoary Nettle) - R
Lythrum hyssopifolia (Grass Poly) - R
*Clarkia ungiculata (Canyon Clarkia) - CC, SC
Epilobium watsonii var franciscanum (Coast Cottonwood) - R
*Oenothera contorta var. stigulosa - G, OW
Oenothera micrantha (Small Primrose) - CC, SC
Zauschneria californica ssp. mexicana (California Fuchsia)
Rhamnus californica (Coffeeberry) - OW, ME
*Phoradendron flavescens var. villosum (Oak Mistletoe) - OW, ME
*Acer macrophyllum (Bigleaf Maple) - R
Acer negundo ssp californicum (Box Elder) - R
Apiastrum angustifolium (Mock Celery) - G
Apium graveolens (Celery) - G
Berula erecta (Water Parsnip) - R
*Conium maculatum (Poison Hemlock) - ME, OW, CC, SC, G
Lomatium caruifolium - ME, G
*Lomatium utriculatum (Bladder Parsnip) - G, OW
Oenanthe sarmentosa (Pacific Oenanthe) - R
Osmorhiza brachypoda (California Cicely) - OW
*Delphinium patens - CC, SC, OW
*Lithophragma heterophylla - ME, OW
*Sanicula bipinnatifida (Purple Sanicle) - R, G
*Sanicula crassicaulis (Gambleweed) - ME, OW, R
*Bromus mollis (Soft Chess) - G
Polypogon australis
Fumaria officinalis - (Fumitory)
Fumaria parviflora - (Fumitory)
Arenaria pusilla - (Sandwort)
Chorizanthe coriacea - CC, SC
Phacelia viscida var. albiflora - CC, SC
Limosella acaulis (Mudwort) - R
Veronica catenata - R

APPENDIX C6

Riparian Zone Mitigation Plan

APPENDIX C6

D R A F T

CONCEPTUAL RIPARIAN MITIGATION PLAN FOR THE NEW SAN CLEMENTE PROJECT CARMEL RIVER, MONTEREY COUNTY

Prepared by

Henrietta Stern

Monterey Peninsula Water Management District

August 26, 1987

TABLE OF CONTENTS

DRAFT

CONCEPTUAL RIPARIAN MITIGATION PLAN FOR THE NEW SAN CLEMENTE PROJECT, CARMEL RIVER, MONTEREY COUNTY

I. INTRODUCTION

The Monterey Peninsula Water Management District (MPWMD) has proposed a new water supply project on the Carmel River. Its purpose is to (1) augment municipal supply to provide for planned growth, (2) provide drought protection for the community and (3) enhance the Carmel River environment, with emphasis on the steelhead fishery.

In May 1987, the District Board selected three feasible alternatives: a 16,000 acre-foot (AF), 20,000 AF or 29,000 AF New San Clemente (NSC) Dam and Reservoir. Each would be combined with new wells in Carmel Valley or Seaside to increase production capacity. These projects, along with the No Project alternative, are being analyzed in a joint EIR/EIS prepared by the District with guidance from the U.S. Army Corps of Engineers (Corps).

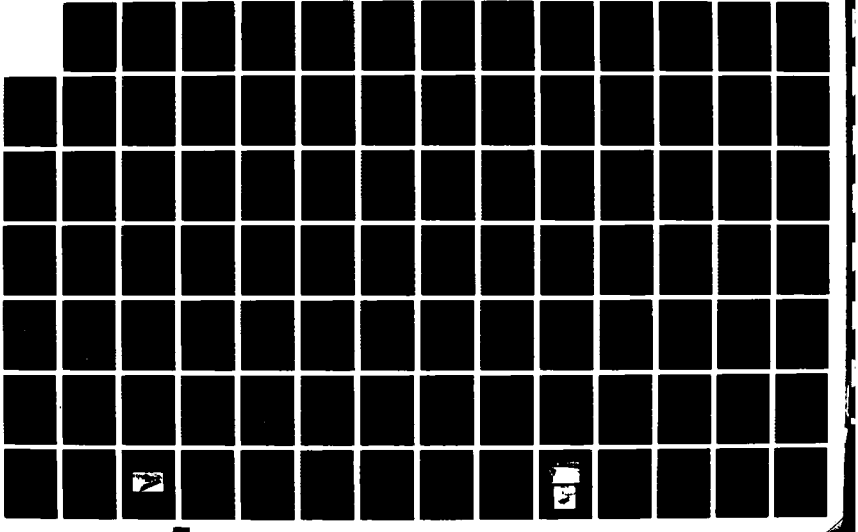
Federal and state law prescribes that when a development action causes adverse change to a habitat (e.g., inundation by a new reservoir), the applicant must consider ways to avoid, minimize or compensate for the loss of environmental resources. Specifically, the District must develop a mitigation plan that will compensate for the loss of various types of habitat due to inundation by the NSC reservoir or by construction activities associated with the project.

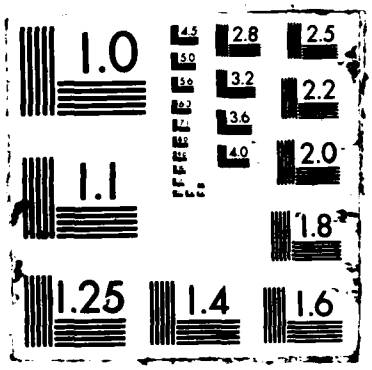
In April 1987, the District met with representatives from the Corps, the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG). The purpose of the meeting was to acquaint these individuals with the project, identify potential beneficial and negative impacts and discuss acceptable mitigation concepts.

The agency representatives agreed that three types of habitat would be inundated by the new reservoir: instream, upland, and riparian (streamside vegetation). All parties agreed that the mitigation plan should not address the instream habitat as separate analyses focusing on the steelhead fishery have been performed (DW Kelley and Associates; 1986a, 1986b, 1987a, 1987b). Because the upland habitat was rated as Resource Category 4 ("plentiful, lesser value") by USFWS, all parties agreed that mitigation for this habitat type should entail obtaining management easements or property from private owners to benefit wildlife and the public via increased habitat values, recreation opportunities or public safety. Mitigations for upland habitat are discussed in the main body of the EIR/EIS.

AD-A185 031 ENVIRONMENTAL IMPACT STATEMENT FOR THE NEW SAN CLEMENTE 2/3
PROJECT MONTEREY..(U) CORPS OF ENGINEERS SAN FRANCISCO
CA SAN FRANCISCO DISTRICT SEP 87

UNCLASSIFIED F/G 13/2 NL




1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
6.3

Because riparian habitat was rated as Resource Category 2 ("limited acreage, valuable") by USFWS, discussion focused on appropriate mitigations for riparian habitat that would be inundated by the project. Thus this plan addresses the present quality of the riparian corridor above and below the existing San Clemente Dam, potential beneficial and adverse impacts of the No Project scenario, the proposed new dam, and proposed mitigation projects. It focuses on mitigations for the 29,000 AF project, as it is the largest alternative and would have the greatest impact.

II. GOALS AND OBJECTIVES

The principal goal of this mitigation plan is to compensate for the loss of riparian habitats within the reservoir inundation area by preserving or enhancing the environmental quality of the riparian habitat on the Carmel River in an economic and efficient manner.

The goals and objectives related to the preservation and enhancement of the environmental habitat quality in the river are based on the mitigation policies of the USFWS and CDFG. The USFWS Mitigation Policy and Goals (F.R. 46(15): 7644-7663, January 23, 1981) for a Category 2 resource is "no net loss of in-kind habitat value." The general CDFG policy for riparian habitats may be summarized as "for each acre lost or degraded, two acres of equivalent habitat must be established or enhanced." It should be noted that the actual acreage required to achieve the desired compensation may differ from these goals and will be identified in the final mitigation plan.

The MPWMD, in consultation with the responsible agencies, has identified the following conceptual methods of achieving adequate mitigation:

(1) Reintroduction of riparian habitats in disturbed areas;

(2) Enhance existing riparian areas;

(3) Preserve existing riparian areas that have development potential and may be destroyed or disturbed in the future.

As stated above, this plan attempts to satisfy responsible agency requirements in as an efficient and economic manner as possible. A cost/benefit analysis of each mitigation alternative will be completed to determine which is most cost efficient.

The final mitigation plan will be developed within the context of other planning efforts on the Carmel River, including the Carmel River Management Program (CRMP), local and regional planning efforts as well as the proposed project. For example, one of the goals of the proposed project is to enhance the downstream riparian corridor and fish habitat via appropriate water releases throughout the year. The beneficial impacts associated with this

feature of the proposed project will be quantified and located to assure that they are not duplicated as mitigation efforts. Likewise, planned revegetation efforts of the CRMP would not be identified as mitigation for the proposed project.

III. EXISTING CONDITIONS

A. GEOGRAPHY AND RIVER CONDITIONS

Numerous studies have been performed on the Carmel River. Matthews (1987) summarized the existing conditions to provide a baseline for evaluating potential impacts of the NSC project and "no project" alternatives. Except where noted, the following information is taken from his report.

The 36-mile Carmel River drains a rugged 255-square mile basin on the Central California coast, and enters the Pacific Ocean at Carmel Bay. In its upper 21 miles, the river runs through steep canyons and modest accumulations of alluvial material. In its lower 15 miles, the river traverses an alluvial valley, and decreases its gradient from .005 at Carmel Valley Village to .003 as it nears the Bay (Figure 1) (Page and Matthews, 1984).

The upper watershed is sparsely settled and a large portion lies within the Ventana Wilderness of the Los Padres National Forest. The lower watershed is more developed, with most of the population centered at Carmel Valley Village. Extensive residential and commercial development, including several golf courses, has also occurred from the river mouth to the Narrows (10 miles upstream) in the past two decades.

Over 90% of precipitation (almost all rain) falls between November and March. Thus significant streamflow is generally restricted to winter months. Orographic effects are pronounced; rainfall decreases from an annual average of 36 inches in the headwaters to 14 inches near the valley mouth.

The historic mean annual flow at two USGS gages (one at Robles del Rio, one at "near Carmel") below the existing San Clemente Dam are 73,900 AF/yr and 86,000 AF/yr, respectively. Average monthly discharge for February near Carmel is 382 cfs compared to nearly 0 cfs by July or August, when the river typically dries up. Estimates of peak discharge vary greatly, from 10,300 cfs to 25,000 cfs for a 100-year event at the Robles del Rio gage. The short USGS streamflow record precludes any definitive flood frequency analysis.

There have been two (possibly three) major floods on the Carmel River in historic times. The largest, estimated as a 500-year event, occurred in 1862. The second, estimated as a 100-year event by the Corps, occurred in March 1911. The third less well documented event occurred in 1914 (Page and Matthews, 1984).

Both suspended sediment load and bedload have been measured since 1981. Suspended load comprises 75% of the total sediment outflow from the Carmel River system. At Robles del Rio, little bedload transport occurs until about 2000 cfs, when the cobble armor begins to mobilize. Low transport rates are due to the existing San Clemente Dam, four miles upstream (river mile 18), that traps all bedload from the upper watershed. Recent studies show that 82% of bedload comes from bank and channel erosion between Robles del Rio and the near Carmel gage at Via Mallorca Road.

Channel geometry has changed significantly since the 1911 flood. Impacts of droughts, flooding and development have led to destabilized reaches, where changes occur during storm events with peak discharges exceeding 2000-3000 cfs. In stable reaches, bank full widths are consistently 80 to 100 feet. Unstable widths can vary from 100 to 500 feet.

Grain size below the existing San Clemente Dam decreases dramatically, indicating the effect of the dam on channel bed composition. Because the dam traps bedload, the riverflow passing over the dam has progressively winnowed out the fine fractions from the downstream riverbed, leaving a very coarse armor layer.

B. HISTORY AND BACKGROUND

Prior to European settlement, Carmel Valley was occupied primarily by the Costanoan tribe. In the upper valley, Esselen camps also existed. Spanish explorers in the 1602 Viscaino maritime expedition were the first Europeans to visit the area. Spanish occupation of the area began with the 1769 Portola expedition. The first non-native settlement near the mouth of the valley was established in December 1771, when Father Junipero Serra moved his mission from Monterey to its present Carmel site.

The early 19th century was the advent of large ranching and farming operations in Carmel Valley. By the 1830s, the Mexican government had issued large land grants, primarily to Mexican citizens. From 1846 to 1850, many of these lands were taken by American owners. By the late 1850s, few Mexican holdings remained. For the following century, little developemnt occurred, and the valley was primarily an agricultural area. The San Clemente Dam was built in 1921 to provide water for the Hotel Del Monte resort and other development in Monterey. The Los Padres Dam (river mile 25) was completed in 1949 to supply the growing Peninsula population (Breschini, personal communication).

Matthews (1987) summarized the major historical changes in the river channel. The flood of 1911 caused significant changes and left a wide flood terrace. In the absence of subsequent major floods and the completion of the San Clemente Dam in 1921, the river developed a dense riparian forest, a narrow incised channel and became increasingly sinuous. Aerial photographs indicate little change between 1939 and 1965, prompting researchers to

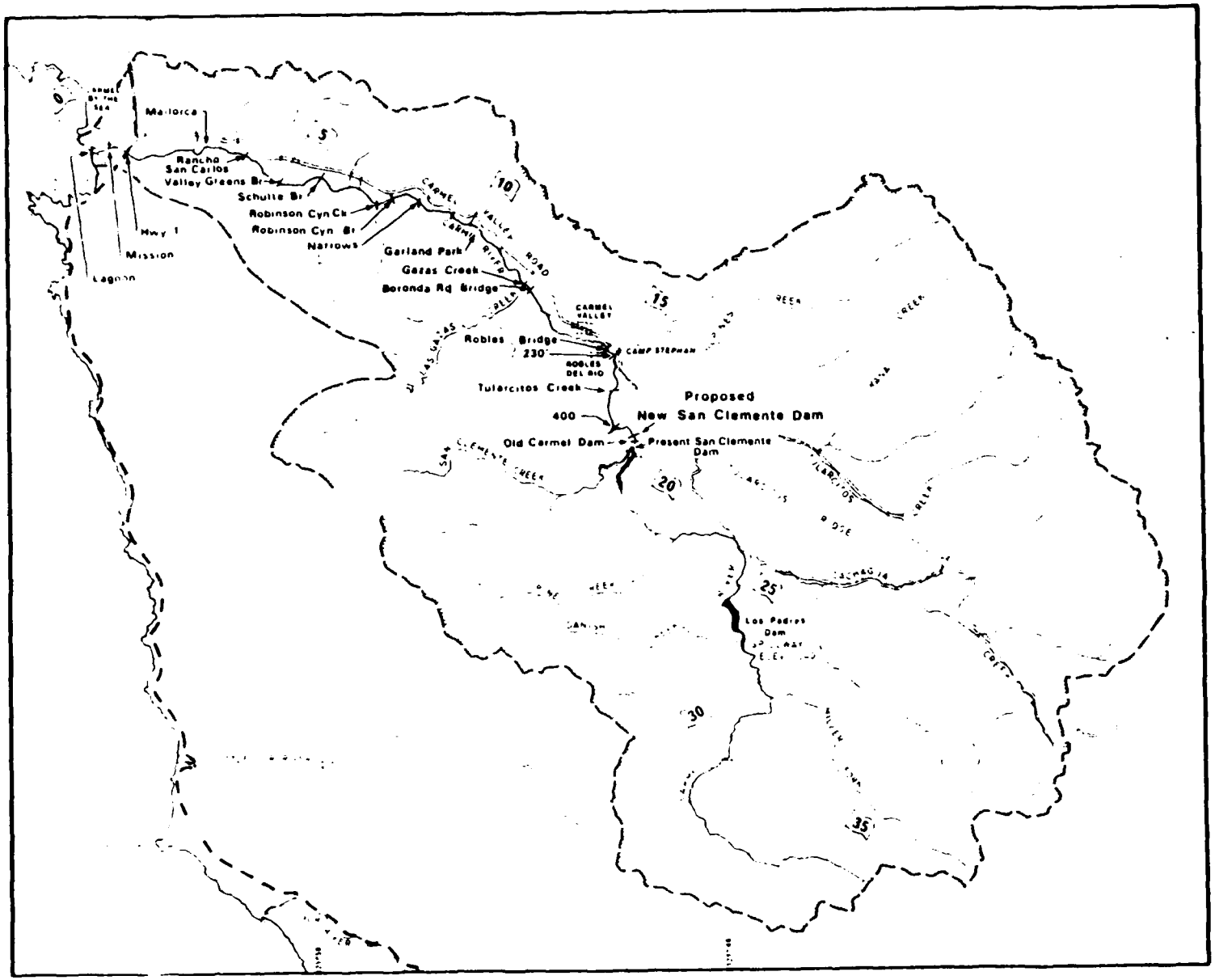


Figure 1. Carmel River showing location of the proposed New San Clemente Dam.

suggest that a dynamic equilibrium had been reached by 1939.

Subsequent to the 1960s, significant development in the form of subdivisions, golf courses, resorts, and shopping centers occurred from Highway One to Carmel Valley Village. These directly impacted riparian vegetation through wholesale removal or reduced water table levels from pumping.

Following increased pumping and the 1976-77 drought, when large amounts of riparian vegetation died, many reaches have become unstable. Recent surveys indicate that changes continue in unstable reaches, especially in storms with discharge greater than 2000-3000 cfs.

C. CARMEL RIVER MANAGEMENT PROGRAM

Several agencies share management responsibility for the Carmel River. The County of Monterey regulates land use, issues grading and erosion control permits and enforces federal floodplain regulations. CDFG requires streambed alteration permits for work within the riparian corridor and river channel. The MPWMD has developed a restoration program known as the Carmel River Management Program (CRMP), co-funded by riverfront property owners and user fees on water bills.

The CRMP was developed in response to a request by riverfront property owners who perceived a need to protect the natural, social and economic values of the Carmel River. A citizens advisory committee that was formed recommended a comprehensive management program. The CRMP was approved by a vote of property owners in 1983 and is embodied in MPWMD Ordinance No. 10 (Attachment A).

As stated in the preamble to the Ordinance, the program will "protect the water course, the watershed, public ways, life and property ....; promote the restoration of riverbanks and scenic resources; reduce environmental degradation; and enhance the fish and wildlife habitat" (Page and Matthews, 1984). CRMP activities include regulation and coordination of erosion control construction by private parties, vegetative and structural works to stabilize river banks, riparian enhancement and revegetation, public education, monitoring and data collection, engineering surveys and emergency assistance during floods.

The CRMP is authorized in Assessment Zone No. 3, which extends from Klondike Canyon (river mile 14) to the river mouth. Permit boundaries are defined as that land within 25 lineal feet of the riverbank assessment line, which is the waterline of the Carmel River during a flow with a 10-year recurrence interval. This limits much of the program to a narrow strip of land alongside the channel, and does not encompass the entire riparian corridor.

Th RMP began a riparian vegetation program in 1984, and has p. ted over 50,000 feet of willow trenches in various locations since then. Drip irrigation systems have been installed for most plantings in the lower Carmel to insure survival through the dry summers; results are very encouraging to date. CRMP also provides willows stems free of charge and assists property owners who wish to plant them.

Planting sites are restricted to gravel bars and other slightly elevated areas as plants die in areas that are submerged for extended periods of time. Unfortunately, these submerged areas are often the most critical. As a result, CRMP is now designing projects that incorporate relocation of gravel bars combined with extensive revegetation. Limited funding allows design and construction of one major project per year. Because the CRMP is authorized for a 10-year period, ending in July 1993, five projects are expected to be completed by 1993. Unless Ordinance No. 10 and the assessment zone are reauthorized, the program will cease or be greatly curtailed.

D. VEGETATION

Riparian communities are unique habitats that are rapidly disappearing in California. The riparian ecosystems along the Carmel River have been studied extensively since 1981 (Matthews, 1987). Its consistent microclimate and canopy provides cover, nesting sites and feeding areas for fish, birds, game and non-game animals. It also provides erosion control, recreation and aesthetic benefits for riverfront property owners and the public.

Following the 1911 flood, an extensive riparian forest developed along the lower Carmel River. By the 1960s a dense riparian corridor was evident, despite encroaching suburban development on the floodplain. The extensive ground-water pumping and reduced water table levels during the 1976-77 drought resulted in significant die-offs. Floods in 1978, 1980, 1982 and 1983 resulted in massive bank erosion and vegetative losses.

With continued population growth and new wells, more ground water is presently pumped on a regular basis than in 1976-77. As a result, the river goes dry every summer (except 1983, a very wet year) and new riparian seedlings die. Thus the vegetation is unable to regenerate as it would with higher water tables (Matthews, 1987).

IV. RIPARIAN ZONE COMMUNITIES

A. RIPARIAN SUCCESSION

Riparian communities are highly dynamic. The fluvial geomorphic processes of the river environment determine the physical characteristics of channel and its flood plain as well as establishment and survival of riparian vegetation.

The normal successional development of a riparian community depends on adequate available water and a suitable substrate. The existing habitat types on the Carmel River are the result of a number of habitat perturbations, both natural and man-made.

The most common way of initiating the plant succession process in riparian communities is via a high flow event where the existing vegetation is scoured away. The initial woody plant species that move into these disturbed areas are adapted to an open environment and include the cottonwoods, alders, and willows. The seeds of these species are small and contain just enough stored nutrients to penetrate 1-2 inches into the alluvium and to begin opening its first leaf. Thereafter, growth is entirely dependent on food the seedling can produce by photosynthesis. Consequently these seedlings must have access to full sunlight and a readily available supply of water for some weeks after their germination.

These species produce a large seed crop each year and are dispersed by winds that can transport seeds for miles. This prolific production of seeds and extensive dispersal potential generally assures that some seeds will germinate in a suitable site, typically within the moist zone adjacent to the receding waters of the river in the late spring. Seedling survival then depends on the availability of water through the summer months.

The period of the majority of growth and development for cottonwoods and willows in the Carmel River is between February and June, but some development continues until late fall (Woodhouse, 1983). It is during this growth period that the seedlings develop a tap root that will utilize ground-water sources during the dry summer months. The availability of ground water depends on its depth and how much the depth fluctuates throughout the year. If the ground-water table is too deep, the plants will not be able to access this critical water source and the seedlings will die and thus prevent the normal successional process to continue.

The second critical element of a successful successional sequence is the substrate. The texture and size of sediments deposited at any given point in the river channel depends on the velocity of the flows. Common deposition areas where riparian vegetation developes are point and riffle bars. Bends in the river are typically characterized by erosion and loss of vegetation on the outside of the bend; sediment deposition on the inside of the bend is called a point bar. In relatively straight sections of the channel, riffle bars tend to form. Riffle bars tend to occur on alternate sides of the channel and are composed of a linear gravel bar next to the channel with a pool or secondary channel behind the gravel bar.

Willow seedlings favor areas of finer sediments while cottonwoods are able to move into areas of coarser sediments. As the vegetation develops and grows, more and more sediments are deposited in the area as the developing vegetation trap larger sized gravels at the upstream end of the point bar and slows the velocity of the flows so that finer sediments are deposited toward the downstream end of the point bar. The net effect of this process is not only the development of vegetation in structure, but also the advancement of the riparian zone out towards the river channel. Consequently, as the vegetation develops the river channel is narrowed.

Because of the dynamic nature of river systems, the successional process may start over again well before it has advanced to the climax stage. This is generally the case with riffle bars, where the development of the riparian community often does not advance beyond the pioneer stages before another high flow scours the developing vegetation and the process starts again.

In general the successional stages of a riparian community on the Carmel River would consist of willows, cottonwoods, and mule fat in the initial stages; followed by a mixed riparian community of alders, cottonwoods, and willows on the river banks; and climaxing with sycamores, oaks, bays and buckeyes on the upper alluvial plains.

At this time the cottonwood is the dominant species in the mosaic of riparian habitats along the Carmel River. The age class distribution of the cottonwoods along the river suggests that a short-term successional cycle is occurring on the river which favors the cottonwood trees. Cottonwood trees less than 50 years of age are common (Stone, 1971).

At present the Carmel River and its riparian vegetation are suffering from a combination of factors and events including a chronic lack of summertime flows, increased ground-water pumping, impacts of the drought of 1976-77, and urban development. The existing riparian vegetation along the Carmel River is but a remnant of what previously existed, though it appears that additional riparian development is possible in the river plain.

B. EXISTING VEGETATION

Nine riparian habitat types were described in the body of this EIR/EIS. The habitat type definitions were based upon the physical structure of the vegetation and dominant species and are as follows:

Riparian-Mixed Evergreen Forest

This vegetation type is limited to the immediate bottom of the Carmel River canyon where the river channel is approximately 00-150 feet wide, filled with recently deposited gravel and sand between 6 and 15 feet deep, and is immediately adjacent to the

canyon slopes. The vegetation structure is highly variable ranging from a typical forest community with a tree overstory and a brush and herbaceous understory, to open stands of scattered trees with little understory, to dry washes with very little or no vegetation cover.

In some places, the riparian community is indistinguishable from the mixed evergreen forest type of the adjacent slopes. The dominant tree species are sycamore (Plantanus racemosa), cottonwood (Populus trichocarpa), white alder (Alnus rhombifolia) and willows (Salix spp.) of the riparian community; and oak (Quercus agrifolia), bay (Umbellularia californica), and California buckeye (Aesculus californicus) comprise the mixed evergreen forest community.

The brush understory is typically composed of poison oak (Toxicodendron diversilobum), coffeeberry (Rhamnus californica), wild current (Ribes spp.), blackberry (Rubus vitifolius), and stinging nettle (Urtica holosericea).

The vegetation changes from the riparian type in the canyon bottom to upland types ranging from forest and woodlands on the cooler north- and east-facing slopes to brushland types on the dryer south- and west-facing slope.

There have been numerous surveys and studies on the vegetation associated with the Carmel River flood plain. The lower portion of the river (river mile 1 to 5) supports a well developed riparian forest. This forest is dominated by large deciduous trees (30-60 feet tall) with overlapping canopies. The dominant tree species is the cottonwood with sycamores and willows scattered throughout. The understory varies from bare ground or low herbaceous cover due to recent scouring to a dense scrub thicket of alders immediately along the banks or common brush species such as poison oak and blackberry.

Riparian Woodland or Thickets

These habitats are the most common and extensive type found along the river. Like a forest, a woodland is also dominated by large trees; however, unlike the forest type, the canopies do not overlap, and there is a wide range of tree densities. The most common tree species are identical to the forest type described above.

A thicket is very similar to a woodland except that this community is typically comprised of dense stands of one or two tree species and is less than 20 feet in height. Common and dominant species of the thicket habitat are red willow (Salix laevigata), sandbar willow (Salix hindsiana), cottonwood, and alder. There is a continuum of size and structure complexity between the woodland and thicket habitat types.

Riparian Scrub

This is a common habitat type throughout the middle and lower river, but often limited quantities exist in any given area. This habitat type is most common on gravel bars. It lacks a well-established tree canopy and is dominated by low shrubs 2-10 feet in height. Common and characteristic plant species in this habitat type include mugwort (Artemisia douglasiana), coyote bush (Baccharis pilularis), blackberry, mule fat (Baccharis viminea), and sweet fennel (Foeniculum vulgare). The most extensive stands of this habitat type occur in the middle river section above Garland Ranch Regional Park.

The remaining habitat types are scattered throughout the river valley to a much smaller degree. Dry washes and barren gravel bars represent areas that have recently been scoured by the river; all that has developed is slow herbaceous growth. There are numerous examples of this habitat type in the river bed areas. Emergent vegetation occurs in and along the shallow borders of deep pools with permarent surface water. Typical plant species include sedges (Carex spp.), rushes (Juncus spp.), bulrush, and cat-tail (Typha spp.).

At those points where the river bed is closest to the valley walls, the mixed evergreen forest-riparian type, similar to the upper river area, occurs. Remnants of this type also occur on the upper alluvial terraces. Along some small stretches of the river corridor, the native vegetation has been removed and replaced with ruderal or non-native vegetation. Eucalyptus groves, grass covered banks and newly rip-rapped areas are examples of this habitat type.

V. "NO-PROJECT" CONDITIONS

The following section describes future conditions on the Carmel River if the proposed New San Clemente Project is not constructed. It focuses on the riparian corridor downstream of the existing San Clemente Dam.

A. DETERMINANTS THAT WILL CAUSE CHANGES

1. Existing Dams

As discussed previously, stream conditions and riparian vegetation have changed dramatically below the existing San Clemente Dam (river mile 18) in response to the 1911 flood and dam completion in 1921. The Los Padres Dam (river mile 25), completed in 1949, also contributes to sediment trapping. According to research presented in Matthews (1987), most of the possible changes due to a dam (sediment load, bed degradation and profile, channel width, armoring, increased vegetation) have already occurred.

The existing reservoirs are small (present combined active storage totals 2668 AF) compared to the average annual inflow of 65,000 AF at San Clemente Dam. Thus only the first small storm of the season is affected by reservoir storage, and only if significant drawdown has occurred the previous summer. Because of the destabilizing events subsequent to 1965, the erosion problems identified earlier will persist unless significant stabilization is reached via the CRMP or other program.

2. Carmel River Management Program Termination

The CRMP can provide limited protection for the Carmel River for two major reasons. First, it is authorized by Ordinance No. 10 only until July 1993. As explained earlier, a maximum of five erosion control projects can be completed by this time, which will provide protection for only a portion of the unstable river reaches. Unless a future Board passes a new ordinance and property owners choose to continue financing the CRMP after 1993, erosion control could revert to limited (and sometimes counterproductive) efforts by individuals.

Second, limited funding and constraints imposed by other regulatory agencies or property owners preclude installation of projects that can withstand major storms. Floods greater than a 10-year event could cause extensive damage to CRMP projects, especially recent willow plantings. Larger flood events could significantly alter any unstable area. Thus there would be a need for a continuing program to assure the continuity of river restoration works.

3. Growth and Development

The Cal-Am Water Company provides over 80% of municipal supply to the Monterey Peninsula. The District presently limits total Cal-Am production to 20,000 AF annually (18,600 AF metered sales). This amount is apportioned to seven member jurisdictions (six cities and unincorporated areas of the county) within the District. No new water meters are set within a jurisdiction if it exceeds its annual allocation. As part of a court settlement, this allocation system is being analyzed in an EIR. Economic and environmental impacts are being assessed for several allocation amounts and distribution scenarios. Thus the total allocation amount could change, based on the results of the allocation EIR.

In the New San Clemente EIR/EIS, the No Project Cal-Am production for the year 2020 is limited to 20,000 AF. Because present Cal-Am production is about 18,000 AF, a 2000 AF (11%) increase in demand is anticipated. About 1950 AF of private pumping along the river is also projected for the year 2020, which represents a minimal (1%) increase over existing private demand.

As described by Stern (1986), moderate growth would occur in Carmel Valley under the No Project scenario. County planners anticipate 664 new single family homes, 267 multiple-family dwellings and 130 new jobs in Carmel Valley by the year 2020. This corresponds to a 250 AF increase in water demand, which is modest. Development in the riparian zone would be limited by existing county ordinances, CDFG permit requirements, and federal flood insurance (FEMA) policy that restricts development in the 100-year flood plain. Septic leach field standards also limit the number and density of homes adjacent to waterways.

4. Riparian Vegetation

Analysis of output from the District's Carmel Valley computer simulation model (CVSIM) indicates significant environmental degradation below the Narrows with the No Project scenario. The model simulates performance for a variety of parameters (e.g., flow, aquifer storage) if the 28-year weather sequence from 1958 to 1985 were repeated. In all cases, year 2020 water demand is assumed; normal year demand is projected as 20,000 AF for the No Project alternative compared to 22,895 AF for the NSC alternatives. This discussion will focus on Carmel Valley Aquifer Subunit 3 (AQ3), as 10 Cal-Am production wells and seven significant private wells are situated in this area (the Narrows to the "near Carmel" gage).

Simulated river flow measured at the USGS "near Carmel" gage would be zero about 43% of the time (145 out of 336 months) with the No Project compared to 41% for existing conditions. Every year between 1958 and 1985, except one, would have several months with no flow (See Attachment B for summary tables). For median years (50% exceedance), the months of July through November would be dry. All months except February and March would have zero flow in critically dry years (90% exceedance). This is identical to the simulation for existing conditions.

Water table levels were also examined as previous work concluded that levels exceeding 20 feet would stress riparian vegetation (McNiesh, 1986). Simulated water table levels for AQ3 as a whole would fall below the 20-foot maximum 22% of the time (74 out of 336 months) with the No Project compared to nearly 15% for existing conditions. Drawdown would be more pronounced near the production wells and less pronounced further away. On the average, water levels in September through November would not be adequate. All months except March and April (and even those would be below 15 feet) would be inadequate in dry years (90% exceedance). The ramifications of these simulations in terms of vegetative growth, survival and colonization is difficult to quantify.

5. Carmel River Steelhead Fishery

The Carmel River supports the southernmost significant wild run of steelhead in North America and is heavily fished during an intense but limited season (portions of January through March).

CDFG biologists estimate that the production of sea-run adults has declined 50-75% in the past 60 years, and that natural production will cease in the next decade if habitat destruction from erosion, flow reduction and floodplain encroachment continues (Snider, 1983 cited in Page and Matthews, 1984). Several analyses of the No Project scenario concluded that simulated flows were insufficient to sustain the run. Any series of dry years would reduce the run to a remnant with the No Project alternative (DW Kelley and Associates; 1986, 1987b).

Concentrated fishing activity near popular pools can damage riverbanks and vegetation, especially young willows. As long as intense steelhead fishing continues, localized riparian damage would be expected.

6. Other Public Recreation

Public access to the Carmel River exists at Carmel River State Beach and Garland Ranch Regional Park, some 11 miles upstream; access is also available via county roads and right-of-ways at all county bridges. The river and its associated riparian corridor are enjoyed by many. In addition to fishing, uses include hiking, picnicing, river play, floating (when conditions permit it) and horseback riding (mostly at low flows). Motor vehicles are prohibited from the river channel, but transgressions are known to occur.

Most of this legal activity is relatively harmless, except for occasional trampling of vegetation. Horses are an exception as they can rapidly crush young vegetation and break down river banks. The Carmel Valley Master Plan includes the creation of a "continuous unbroken system" of horse/hiking trails along the river from the mouth to Carmel Valley Village, 15 miles upstream. Mitigations to protect riparian vegetation are part of this plan.

B. SUMMARY OF NO PROJECT IMPACTS

Environmental degradation along the Carmel River is an existing problem and will worsen under the No Project scenario. Sections of the river will remain unstable and continue the destructive erosion patterns documented in recent decades.

The termination of the CRMP in 1993 will reduce the ability to stabilize remaining problem reaches in a coordinated manner. Damage to erosion control structures and vegetative plantings from significant flood events would not be repaired or replaced effectively without this or a similar program.

Increased growth and associated water demand will impact groundwater levels, especially in AQ3, as surface reservoir storage is minimal. The 61-acre riparian corridor associated with AQ3 will suffer damage due to numerous extended periods of zero river flow or inadequate water table levels. The extent and intensity of this damage has not been quantified.

Reduced river flow is deleterious to the steelhead run and the recreational benefits (fishing) associated with it. Public recreation opportunities will continue, or perhaps expand, with the creation of the horse/hiking trails envisioned by the county. However, the quality of these opportunites may be lessened due to lack of river flow. The aesthetic benefits would be reduced as well as any other water-based recreation.

VI. NEW SAN CLEMENTE CONDITIONS WITH NO MITIGATION ACTION

The following sections describe future conditions on the Carmel River if the proposed New San Clemente Project is constructed. It focuses on the riparian corridor downstream of the existing San Clemente Dam.

A. FACTORS THAT COULD CAUSE CHANGES

1. New San Clemente Project Impact on the Carmel River

Construction of the NSC project will have immediate impacts on the riparian corridor. First, from 21 to 31 acres of riparian habitat would be inundated, depending on reservoir size. Riparian vegetation could also be affected by construction activities associated with the dam.

Matthews (1987) noted that it is difficult to separate changes induced by the proposed NSC project from those already induced by the existing two dams. He concluded that the greatest potential for change lay in flow regulation. In general, mean annual flow with the project would be within 5% (3000 AF) of the No Project flow. However, the NSC project would provide much greater annual flow in dry years and slightly less flow in wet years.

All three NSC project alternatives are sufficiently large to substantially modify small and moderate storms if the previous year was dry. The 29,000 AF project dramatically decreased simulated flows with recurrence intervals of 1.5, 2.0 and 3.0 years by 68%, 67% and 33%, respectively. Project effects were minimal, however, above the 5-year storm level (Matthews, 1987).

Possible effects resulting from reductions in the 1.5 to 3.0-year storm flows include reduced sediment loads, reduced channel width, increased vegetation within the channel, increased flood heights, potential problems with tributary sediment dispersal, increased residence time of excess sediment in gravel bars, and potential channel instability if appropriate restoration activities are not taken. Matthews (1987) discussed these effects and noted that they were difficult to quantify as they may vary significantly with the type of water year. District staff are presently quantifying these effects in more detail.

Because enhancement of the Carmel River environment is one of the project goals, it is designed to provide adequate flows that benefit the steelhead fishery and riparian vegetation. These benefits are discussed in subsequent sections.

2. Carmel River Management Program

The funding and reauthorization of the CRMP would continue past 1993 to the year 2020 as part of the NSC project. In terms of riparian vegetation, the scope of the CRMP would remain the same; projects would be limited to the river channel and adjacent banks, not the alluvial terraces. In the period 1993 to 2020, approximately 15-20 additional acres of unstable or denuded habitat would benefit from combined structural and vegetative erosion control works. Future projects would also entail gravel bar relocation to enhance channel geometry or selective clearing of encroaching vegetation to maintain channel capacity.

The extension of the CRMP as part of the NSC project would greatly facilitate the original goal of the program -- to return the river back to its stable mid-1960s configuration. The riparian enhancement resulting from the pot-1993 CRMP revegetation projects could partially compensate for habitat inundated by the new reservoir.

3. Growth and Development

As described in Stern (1986), significant growth within the District would be allowed by the NSC project as water would no longer be a constraint to development. Growth in Carmel Valley would contribute about 15% to the district total. With the project, county planners anticipate 1137 new single family homes, 267 multiple-family dwellings, 660 new jobs and 330 hotel rooms in Carmel Valley by the year 2020. This corresponds to a 493 AF increase in water demand, which is double the amount without the project.

As noted previously, development in the riparian zone would be limited by existing county ordinances, CDFG permit requirements, and federal flood insurance (FEMA) policy that restricts development in the 100-year flood plain. Septic leach field standards also limit the number and density of homes adjacent to waterways. A community sewage treatment system may be necessary before much of this development can occur, as nitrate problems in the ground-water basin already exist in portions of Carmel Valley (EMCON, 1986).

4. Riparian Vegetation

One important reason why the NSC project was proposed is its ability to provide adequate river flow (especially below the Narrows) over an extended period, under a variety of weather conditions. At the "near Carmel" gage, which reflects aquifer subunit 3 (AQ3) status, only 39 out of 336 simulated months (12%) would have zero flows with the NSC project; 25 of these months

would occur only in severe droughts. This value compares to 43% and 41% for the No Project and existing conditions, respectively. In average or median years, adequate flow would exist year-round with the NSC project compared to 7 adequate months per year for the No Project or existing situation. In critically dry years (90% exceedance), zero flows would occur in only five months (August through December) with the NSC project compared with 10 months per year for the No Project alternative or the existing situation (See Attachment B for summary tables).

More significantly, simulated water table levels in AQ3 would be unacceptable only 5% of the time (18 out of 336 months) with the NSC project, again only during severe droughts. This compares to 22% and 15% for the No Project and existing conditions, respectively. Water levels would be at or near the surface for mean and median years. In dry years, only October would barely exceed the 20-foot maximum with the NSC project. This compares to 10 months at significantly deeper levels with the No Project and 8 months for the existing situation.

The data clearly indicate that the 61-acre riparian zone in AQ3 would be enhanced by flows provided by the project. Vegetation in aquifer subunit 4 (AQ4), which is pumped by fewer wells, also benefits from regular flows, especially in dry years. These beneficial impacts of enhanced flow in terms of vegetative growth, survival and colonization are difficult to quantify.

5. Carmel River Steelhead Fishery

Recent studies conclude that the NSC project would have a beneficial impact to the steelhead fishery, assuming passage facilities are properly designed and managed (DW Kelley and Associates; 1986, 1987a, and 1987b). The NSC project should facilitate an increase from the existing run size of 1200-1500 adults to between 2000 and 4000 returning spawners, depending on the quality of Los Padres Dam passage facilities (DW Kelley and Associates, 1987b). This is not surprising as the project is sized and designed to provide adequate flows throughout the steelhead life cycle.

If run sizes are increased, it is reasonable to assume that CDFG may relax some of the fishing season restrictions that presently exist. More frequent or longer "open season" episodes could have impacts on the riparian corridor. More opportunities would exist for fishers to damage river banks or tread on vegetation near popular pools.

6. Other Public Recreation

Increased and extended river flow provided by the NSC project would enhance recreational opportunities for hikers, picnicers, floaters, river frolickers or horseback riders. All groups would experience enhanced aesthetic benefits from the flowing water and healthy vegetation. Water-dependent recreation would experience direct benefits due to more opportunities to enjoy the river.

Hikers and horseback riders would benefit as the county plans to extend trails to the reservoir site if the project is built (Tate, personal communication). This would be facilitated by the change in ownership of lands surrounding the project from private to public entities.

The existing San Clemente reservoir is not accessible to the public. If the NSC project is built, the District's policy is to allow only passive recreation at the reservoir. This means hiking, horseback riding or picnicing; no motorized vehicles, boats, swimming or camping would be allowed. No facilities would be built by the District to accomodate recreation. CDFG has stated that fishing would not be allowed at the reservoir.

The concerns noted in Section V-A-6 are echoed here. Increased recreational opportunities increase the chance of damage to the riparian corridor. Educational programs should be initiated to assure that scenic resources are preserved.

B. SUMMARY OF IMPACTS

Matthews (1987) concludes that anticipated changes in discharge patterns and channel morphology due to the NSC project, if managed properly, can be used to reduce riverbank erosion and reestablish a healthy riparian corridor. Proper management and improvements are more likely to occur because the NSC project will extend the CRMP for several decades.

The NSC project allows significantly more growth in Carmel Valley, but the riparian corridor should be protected from destruction by new construction due to existing regulatory constraints.

Increased flows provided by the NSC project will clearly enhance the estimated 61 acres of riparian vegetation in AQ3. This beneficial impact is due to higher water tables and fewer and less intense bouts of stressful conditions than would exist without the project.

Project fishery releases and carefully designed passage facilities should enhance and restore the Carmel River steelhead run to 2000 to 4000 spawning adults, and increase opportunities for fishing. However, longer and more frequent fishing seasons may lead to increased trampling of riparian vegetation.

Other recreational opportunities will be enhanced due to increased river flow and the expanded horse/hiking trail system possible with the project.

VII. ALTERNATIVE MITIGATION PLANS

As stated in Section I, it is the responsibility of the District to mitigate for riparian habitat that is adversely impacted by

the project. It has not been quantified whether the beneficial impacts outlined in Section VI are adequate compensation for the inundation of up to 31 acres of mature riparian habitat or damage to riparian areas due to other construction-related activities. The following subsections address potential mitigation alternatives, including no mitigation.

A. NO MITIGATION ACTION

1. Description

This alternative entails the construction and operation of the NSC project with no additional mitigation. It should be noted that providing adequate flows for steelhead and riparian enhancement as well as continued funding of the CRMP are included in the project to offset inundation of habitat by the new reservoir. Section VI summarizes expected conditions with the project. A complete general description of project impacts can be found in the main body of the EIR/EIS.

2. Implementation

The NSC project implementation is described in the main body of the EIR/EIS. No additional efforts are required for the No Action mitigation alternative.

3. Impacts

Impacts of the project on the river channel and riparian corridor are reviewed in Section VI-B. A more complete analysis of other impacts is found in the main body of the EIR/EIS. Based on the data cited here, it is clear there would be a net beneficial effect of the project on river stability (if managed properly), riparian vegetation, fish, and recreation. The increased growth allowed by the project should not adversely affect the riparian corridor. Of course, the inundation of riparian vegetation or potential damage due to project construction would be a permanent loss.

4. Concerns

The primary concern with this option is that the project benefits to the riparian corridor may not be enough to offset the losses sustained by inundation or construction activity. In addition, careful management is necessary to preclude possible negative impacts to the river as outlined in Matthews (1987).

5. Property Owners

Riverfront property owners would probably be pleased that the financial burden of the CRMP would be lifted, and they would still reap its benefits. They would also derive increased aesthetic benefits and recreational opportunities due to enhanced river flow. They may experience increased foot or horse traffic

nearby as the county's trail system is installed, but this would occur whether or not the NSC project is built.

6. Evaluation and Trade-offs

It is clear that benefits to the riparian corridor and its users result from the project. From an economic/social viewpoint, the No Action mitigation alternative is preferred. The bond financing of the project (and hence, water bill user fees) would not be as great if no additional mitigations besides those already incorporated into the project were planned. Also, the riparian vegetation that would be inundated or damaged by construction would not be perceived as a loss by the general public because access is presently denied to the project area. Only a few Cal-Am and district employees, large ranchers, and illegal trespassers have ever seen the inundation area.

When viewed from a biological perspective, the No Action mitigation alternative may not be enough. Up to 31 acres of mature riparian habitat would be lost forever by inundation. The estimated 61 acres of riparian vegetation in AQ3 that would be enhanced by the project already exist, though its health or survival may be threatened without the NSC project. The critical question remains: does the protection and enhancement of 61+ acres via increased flows resulting from the project and the revegetation of 15-20 acres via the continuation of the CRMP (76-81 acres total) offset the loss of 31+ acres? If the answer is "yes," no further mitigation is necessary. If it is "no," additional action should be proposed.

B. DONATION OF CONSERVATION EASEMENT FOR SELECTED PROJECTS

1. Description

Twenty six potential projects on the Carmel River totaling 42.7 acres have been identified by District staff. Nearly 18 acres would be at Garland Ranch Regional Park. The potential mitigation project sites are located between the Narrows and the Cal-Am filter plant, about one-half mile downstream of the existing San Clemente Dam.

Projects would entail plantings of cottonwoods, willows and associated riparian species on terraces above the river channel and streambank. Plantings would occur in denuded or marginal areas that once supported (or could support) riparian vegetation. Each project would include an irrigation system, monitoring and maintenance program to facilitate growth and survival. It should be noted that all mitigation projects involve plantings on alluvial terraces above the river and would not overlap CRMP activities.

District staff have successfully planted and maintained 50,000 linear feet of willow stems and would alter their techniques to accomodate larger species. Planting densities, patterns and

species composition would be based on established guidelines in the literature as well as a survey of surrounding healthy riparian communities. Plantings may be in elongated strips, mosaic patches or a solid "gallery," depending on the site.

2. Implementation

The District or a qualified land trust would contact owners of the target properties, explain the purpose and benefits of the project, and request that a conservation easement be donated. Under this scenario, a project would be considered infeasible if the property owner chose not to donate an easement.

District staff or experienced contractors would be responsible for the plantings. District staff and/or cooperating agencies such as the Regional Parks District would be responsible for monitoring and maintenance. In some cases, property owners may wish to participate in these latter tasks.

3. Impacts

This mitigation alternative would benefit the environment as up to 42.7 acres of riparian habitat would be created in sites that are presently denuded or of poor quality. This would increase feeding, nesting and shelter opportunities for a variety of riparian birds, mammals, herptofauna, fish and invertebrates. The public and property owners would benefit from an enhanced viewshed and recreational opportunities such as birding. Potential habitat benefits have not been quantified.

4. Concerns

The major concern is whether property owners will choose to donate the conservation easements. The District has little control over a voluntary action and values good relations with riverfront property owners. There are minimal concerns regarding the technical aspects of the projects. Water is available, though small wells may need to be drilled for irrigation, and District staff have experience with riparian plantings and irrigation. The myriad permits necessary for any work in the riparian zone and restrictions set by property owners could hamper planting and maintenance efforts.

5. Property Owners

Property owners would benefit in several ways from the proposed projects. Their land would be stabilized and aesthetically enhanced free of charge; indeed, some may receive tax benefits for their donation. Once the plants grow, privacy would be enhanced as homes would be less visible to passing hikers or horseback riders on the riverfront trails. Intrusions by District staff or other personnel for monitoring and maintenance would be minimal. Thus it is reasonable to assume that many property owners would respond favorably to this plan. There is always the possibility that some would insist on some sort of

payment.

6. Evaluation and Trade-offs

It is not known whether implementation of all these projects would be necessary or feasible. The total capital cost of the NSC project could increase by $430,000 dollars (43 acres @ $10,000 per acre) if every project is implemented. However, the average resident would experience only a 50-cent annual increase on his or her water bill to pay for the projects.

If this alternative is selected, priority projects should be on Regional Park property (18 acres on Garland Ranch and additions). Agency staff can coordinate plantings and maintenance, and the public will have the maximum opportunity to enjoy the aesthetic and recreational benefits of the mitigation projects for which they are paying. For minimal cost the public and the environment would receive maximum benefit-- the creation of quality habitat where none presently exists.

C. PAYMENT FOR CONSERVATION EASEMENTS

1. Description

This alternative is identical to the one described in Section VII-B except conservation easements would be purchased from property owners. A project would be deemed infeasible if the owner refused to sell an easement.

2. Implementation

Implementation would be identical to the previous alternative except conservation easements would be purchased.

3. Impacts

Environmental impacts would be identical to the previous alternative.

4. Concerns

Concerns would be identical to the previous alternative, except the issue would be desire to sell rather than to donate.

5. Property Owners

Benefits to property owners would be very similar to the previous alternative. Instead of potential tax benefits, the owner would derive income from the easement. Other impacts would remain the same.

6. Evaluation and Trade-offs

Environmental benefits would be identical to those described for the previous alternative. The major economic difference would be an increase in cost to pay for purchase of the conservation easement in addition to the project costs themselves. It is unknown at this time what the financial impact of purchase would be. Again, the focus should be on Regional Park property as the public would receive the greatest benefit from projects on this land. In addition, it would be very difficult, if not illegal, for a public agency to demand an exorbitant price for the easement.

D. PURCHASE OF PROPERTY FOR PROJECTS

1. Description

This alternative is identical to the one described in Section VII-B except property would be purchased outright from owners. A project would be deemed infeasible if the owner refused to sell the desired acreage.

2. Implementation

Implementation would be identical to the previous alternative except property would be purchased.

3. Impacts

Environmental impacts would be identical to the previous alternative.

4. Concerns

Concerns would be identical to the previous alternative, except the issue would be desire to sell real property rather than an easement.

5. Property Owners

Benefits to property owners would be very similar to the previous alternative. Instead of potential tax benefits, the owner would derive income from the property sale. It is unlikely, however, that owners would wish to sell portions of their riverfront property as access rights to the river are highly valued. Loss of riverfront portions would also reduce the selling value of the entire parcel. County ordinances may also prohibit splitting of parcels.

6. Evaluation and Trade-offs

Environmental benefits would be identical to those described for the previous alternative. The major economic difference would be the significant increase in cost to purchase the property in

addition to the project costs themselves. It is unknown at this time what the financial impact of purchase would be. Again, the focus should be on Regional Park property as the public would receive the greatest benefit from projects on this land. However it would be very unlikely for the Regional Parks District to sell parts of Garland Ranch. This alternative has the lowest probability of success due to its increased cost and owner reluctance to sell their riverfront property.

VIII. CONCLUSIONS

Based on the previous analysis, the proposed NSC project provides beneficial impacts to the riparian corridor downstream of the dam. It is presently unclear whether none, some or all of the mitigation measures described in section VII-B should be pursued. If the enhancement actions and benefits incorporated into the NSC project (Sections VI and VII-A) do not suffice, the preferred alternative should be donation of conservation easements (Section VII-B) as mitigation goals would be achieved at the lowest cost. It is not clear whether some or all of the potential projects need be pursued. Garland Ranch projects should have top priority as the public would derive the most environmental and recreational benefit.

Given the uncertainties that currently exist, future refinements of this plan should address:

(1) Does the "no mitigation action" alternative suffice?

(2) If not, do additional mitigation projects in Garland Ranch alone suffice?

(3) Should all potential projects identified in Section VII-B be pursued?

(4) Should additional projects above and beyond the 25 currently identified projects be explored?

These decisions depend, in part, on more complete quantification of benefits and impacts for all project alternatives as well as responsible agency responses to this draft document.

REFERENCES

Breschini, Gary. Telephone conversation with Archaeological Consulting regarding Monterey history, June 22, 1987.

Corps of Engineers, 1981. Feasibility Report on Water Resources Development - CArmel River, May 1981.

Kelley, DW and Associates, 1986a. Assessment of Carmel River Steelhead Resource, Volume I: Biological Investigations, September 1986.

_____, 1986b. Report on Tertiary Screening of Water Supply Alternatives in the CArmel River Basin, December 1986.

_____, 1987a. Preservation of the Carmel River Steelhead Run with Fish Passage Facilities Over San Clemente Dam or with a Hatchery Near its Base, April 1987.

_____, 1987b. Assessment of the Carmel River Steelhead Resource, Volume II: Evaluation of the Effects of Alternative Water Supply Projects on the Carmel River Steelhead Resource, June 1987.

Matthews, Graham, 1987. Evaluation of the Effects of Feasible New San Clemente Project Alternatives on the Channel Stability and Sediment Transport of the Carmel River. MPWMD Technical Memorandum 87-13 (Draft), June 1987.

McNiesh, Charles, 1986. General Effects of Water Table Drawdown on Water Stress of Riparian Vegetation Along the Lower Carmel River. Memorandum dated February 3, 1986.

Page, Gary and Graham Matthews, 1984. Carmel River Management Plan, MPWMD, March 1984.

Stern, Henrietta, 1986. Development of Water Demand and Land Use Projections in the Years 2000 and 2020 with and without a Water Supply Project. MPWMD Technical Memorandum 86-08, November 1986.

Stone, E.C., 1971. The Dynamics of Vegetation Change Along the Carmel River. Cal-Am Water Company, March 1971.

Tate, Gary. Telephone conversation with Regional Parks director on May 6, 1986.

Woodhouse, R., 1983. Baseline Analysis of the Riparian Vegetation in the Lower Carmel Valley, January 1983.

ATTACHMENT A

ORDINANCE NO. 10

An Ordinance Of The Board of Directors
Of The Monterey Peninsula Water Management District
Amending Its Rules and Regulations And Implementing
The Carmel River Management Plan

WHEREAS, the Board of Directors of the Monterey Peninsula Water Management District finds as follows:

1. The California Legislature has charged the Monterey Peninsula Water Management District with the integrated management of water resources and problems affecting the Monterey Peninsula and Carmel River basin.

2. The Monterey Peninsula Water Management District desires to protect flows of the Carmel River, and its surrounding environs.

3. The Monterey Peninsula Water Management District has formed an improvement zone (Zone #3) which will facilitate management of the Carmel River, and perform works and projects for the benefit of the zone.

4. The Monterey Peninsula Water Management District has promulgated its Carmel River Management Plan which will protect the water course, the watershed, public ways, life and property in the zone; promote the restoration of river banks and scenic resources; reduce environmental degradation; and enhance the fish and wildlife habitat.

5. Implementation costs for the River Management Zone derive from, and shall be paid by, benefit assessments upon zone properties, and such zone project costs which are to the exclusive benefit of this zone shall be paid from zone assessments to the extent feasible.

6. Those properties lying to the west of Val Verde Drive are benefitted to a lesser extent by the activities of this zone in that a substantial portion of this area has dikes and this reach is less subject to erosion than other bank reaches of the river.

7. Other activities contemplated by the Carmel River Management Plan shall be funded and paid by utility user fees, and such costs shall inure to the common benefit of water users, and to the common benefit of the District as a whole.

8. A sufficient correlation exists between meter size and water usage to allow user fees to be set by meter size groups.

9. The amount of the user fee to be collected is not sufficient to fund extensive administrative or collection costs, and the assessment of such user fee against individual well users and small water systems would not be cost effective.

10. The purpose of this ordinance is to protect the Carmel River and its riparian corridor including visual aspects and value as wildlife habitat, stabilize the river channel, and promote the public health and safety by lessening potential local erosion damage and flood related hazards.

NOW, THEREFORE, BE IT ORDAINED that Ordinance No. 10 shall be adopted and incorporated as appropriate to the District's Rules and Regulations.

On motion of Director Heuer and second by Director Lee, the foregoing ordinance is duly adopted this 26th day of July, 1983, by the following votes:

AYES: Directors Williams, Peters, Woodworth, McClintock, Heuer and Lee

NAYES: None

ABSENT: Director Henson

I, Gladys McKillop, Secretary of the Board of Directors of the Monterey Peninsula Water Management District, nereby certify that the foregoing is a full, true and correct copy of an ordinance duly adopted on this 26th day of July, 1983, and now is of record in my office.

Witness my hand and seal of the Board of Directors this 29th day of July, 1983.

Gladys McKillop

Gladys McKillop, Secretary

Section 1 Carmel River Management. The following rules shall be added as Regulation XII to the Rules and Regulations of the Monterey Peninsula Water Management District.

Regulation XII Carmel River Management

Rule 120. Carmel River Advisory Committee.

A. Committee Purpose. The Carmel River Advisory Committee is a standing committee of the District. The Committee shall advise the Board of Directors with regard to management of the Carmel River and to any matter referred to this committee.

B. Committee Organization.

1. The Carmel River Advisory Committee shall be comprised of seven (7) members. Each Director of the District shall appoint one member to this Advisory Committee. Committee members shall serve a term of two (2) years, which term shall expire on

June 30, provided, however that the first seven (7) appointees shall, by lot, determine that four (4) members shall serve for one (1) year, and three (3) members shall serve for two (2) years. Appointment to any vacancy shall be made by the Board of Directors for the remainder of the unfulfilled term. A vacancy shall be created by resignation or in the event a Committee member fails to attend three (3) consecutive regular meetings without good cause as determined by the Board of Directors. Nomination to fill any vacancy or to reappoint any committee member shall be made by the Director's seat which exercised the original appointment to that position. Notwithstanding any other provision, this Committee shall cease to function on June 30, 1993.

2. All meetings of the Committee shall comply with the Ralph M. Brown Act. At the first meeting held in each fiscal year, the Committee shall elect a chairperson and vice-chairperson to preside at Committee meetings. The committee may adopt rules governing the conduct of its meetings.

Rule 121 Carmel River Management Funds.

A. Benefit Assessments. Benefit assessments which derive from property fronting the Carmel River pursuant to the Carmel River Management Zone shall be administered pursuant to this regulation. The maximum assessment within Zone #3 shall be $0.35 per lineal foot of river bank, provided, however, that such maximum assessment shall increase or decrease each year by the CPI inflator as determined by the County of Monterey for budget setting purposes. Real property which fronts the Carmel River within Zone #3, and which lies in an Area of Reduced Benefit as that term is defined by these Rules and Regulations, shall not be assessed in an amount exceeding $0.0875 per lineal foot of river bank, provided however that said maximum assessment shall increase or decrease each year by the CPI inflator as used by the County of Monterey for budget setting purposes. The total assessment within the zone shall not exceed $90,000 per year. The actual amount to be assessed shall be $0.32 per lineal foot during the first year, and $0.0875 per lineal foot for property within the Area of Reduced Benefit, and shall be determined by the process set forth below in Rule 121(B) for each subsequent year. Notwithstanding any other provision of these Rules and Regulations, no assessment credit shall be allowed for the first year of zone assessment and no assessment credit shall be allowed at any time in the Area of Reduced Benefit. No assessment shall be made pursuant to this rule on or after July 1,1993.

B. Calculation of Assessments.

1. A review of all assessments pursuant to this Rule shall be made annually. Such review shall be conducted by the District Board with the advice of the Carmel River Advisory Committee pursuant to the process set forth below to determine the assessment needs of Zone #3, to determine the assessment needs of

the Area of Reduced Benefit, to determine the assessable river frontage, the existance of a constructive Riverbank Assessment Line, and to calculate an actual assessment for each parcel within the zone. The Carmel River Advisory committee shall review any application for prior work or private works credit and tender its written recommendation before action on that application is taken by the Board.

2. In order to determine the actual assessment per parcel, the Board shall first conduct a public hearing concerning current river management needs. Thereafter, the Board will calculate the length of river bank assessment line subject to each assessment. The Board will then, upon the advice of the Carmel River Advisory Committee, determine the amount of credit which shall be allowed in accord with subparagraph B3 below. Finally, the Board will determine the assessment for each parcel.

3. Assessment credits may be allowed by the Board for Zone #3 assessments provided, however, that no assessment credit shall be allowed in the Area of Reduced Benefit. Upon application of an affected property owner, credit may be allowed for any work, improvement, or other activity undertaken by a property owner to protect, restore or stabilize that portion of the riverbed or riverbank which lies on the applicant's property provided these meet the standards to be imposed pursuant to Rules 123, 125, and 126 upon works undertaken by the District or by permit within the zone. The Board may grant credit for prior works and private works equal to 100% of the cost of prior or private works provided those works comply with the technical standards as described pursuant to this regulation. No credit shall be allowed for the first year of zone assessment. For each subsequent year, no credit shall be allowed which exceeds 50% of the proposed assessment for the particular parcel whose owner seeks the prior or private works credit. Unused portions of the prior works credit shall be carried forward for use as credit in later years. The Board shall prepare written findings upon advice of the Carmel River Advisory Committee regarding each application for prior works credit on the following concerns:

a) the nature of the prior work or private works
b) the extent to which the prior work or private work meets District standards
c) the direct cost to the owner, or predecessor in interest, of the prior work or private work
d) the source and character of funds used to finance the prior or private work
e) the amount of credit previously granted for the prior work or private work
f) whether the property owner has granted an easement to the District for access to the Riparian corridor.

Assessment credits shall be mandatory in those circumstances where the works comply with all standards set forth in this regulation and no question exists regarding the cost of such prior or private works, private (non-public) funds were used to

finance such works, and the property has been subordinated to an easement in favor of the District in order to grant access to the riparian corridor for the purpose of the District undertaking specific river bed and bank works, or to acquire rights of way for District irrigation systems. Where all such conditions are not met, the grant, partial grant or denial of the credit shall lie in the discretion of the Board based on the facts presented regarding the application. The grant, partial grant, or denial of a credit application may be appealed by the property owner, the District, or any third party for rehearing before the Board of Directors pursuant to Rule 71, Assessment Appeals.

4. Within fourteen (14) days following the conclusion of the hearing held pursuant to this Rule, each property owner within Zone #3 shall be given written notice of the actual amount to be assessed against his property, including the amount of credit as determined by the Board.

C. User Fees. River Management User Fees shall be administered pursuant to this Regulation.

1. Each water distribution system which posseses 50 or more connections and derives all or part of its water supply from the Carmel River, the Carmel River watershed, or the Carmel Valley aquifer shall be subject to a River Management user fee. The owner or operator of each water distribution system shall collect the fee specified herein, but the user shall bear ultimate responsibility for the payment of such fee. To the extent feasible, river management fees are to be levied annually, during the third (3rd) quarter of the calendar year, and are to be charged upon the same bill and collected as one item together with all other charges made by that water distribution system.

2. Where the General Manager determines such fee collection to be infeasible, the owner or operator of the water distribution system shall comply with this section by providing to the District the following information in a form acceptable to the District:

a) the name of each water user
b) the address at which each user receives his/her water bill
c) the amount of water each user consumed during the preceding 12 months.

D. Calculation of River Management User Fees.

1. The Board of Directors shall determine annually the amount of River management user fee to be collected pursuant to this Regulation after receiving the recommendation of the Carmel River Advisory Committee. The maximum sum to be collected pursuant to this user fee shall not exceed a District wide aggregate of $105,000 per fiscal year, provided, however that such maximum sum shall increase or decrease each year by the CPI inflator as determined by the County of Monterey for its budget

setting purposes, or as a result of revenues generated by minimum user fees, provided however, that the total District wide aggregate user fee shall not exceed $210,000 for any reason. No user fee shall be made pursuant to this rule on or after July 1, 1993.

2. Prior to setting the user fee to be collected for each subsequent year, including Fiscal Year 1983-84, the District Board shall first conduct a public hearing regarding river management needs and utility user concerns and seek the advice of the Carmel River Advisory Committee. At the close of such hearing, the Board shall determine by Resolution:

a) the amount of money needed to fund general river management activities pursuant to this regulation,
b) the estimated amount of assessments which will fund specific river management works,
c) the total amount of user fee to be collected pursuant to this regulation,
d) the manner in which the fee is to be collected, and
e) the total amount of General Fund, if any, to be used to fund river management activities pursuant to this regulation.

3. A separate user fee amount may be established by the Board for each size of water meter, provided that the aggregate fee collected from that size group substantially relates to the quantity of water used by all persons or entities which possess that meter size. Such groupings shall not operate to increase the District-wide user fee limit as set forth above.

E. Expenditures. River Management User fees, Zone #3 assessments, District General Funds, grant funding, and donations received pursuant to these Rules and Regulations may be expended by the District for river management activities as set forth in Rule 123, and further provided that each expenditure shall be accounted for in consonance with Rule 122 and the general accounting principles to which the District adheres.

Rule 122. River Management Fund Accounting.

A. Fund Segregation. The District shall maintain separate accounts for all benefit assessments, and user fees received by the District pursuant to this Regulation.

B. Benefit Assessment Funds. Benefit assessment funds shall only be expended for the benefit of the single zone from which the assessment is derived. Such funds shall finance only those works, improvements, or activities which inure directly to the benefit of zone property.

C. River Management User Fees. River Management User fees shall be expended for the common benefit of all utility users, and for the common benefit of the District as a whole. Such funds shall finance those works and activities which inure to the benefit of

the District as a whole. User fee funds shall not finance non-emergency zone works or projects if benefit assessment funds are available.

D. Emergency Sinking Funds. The District may set aside a portion of each annual assessment and each annual user fee to create a fund to finance emergency river management works. Grant funds and donations for river management works may be placed in such Sinking Fund; transfer or expenditure of such funds shall be at the discretion of the Board.

E. Fund Transfers. Although the river management user fee fund and the benefit assessment fund are to be maintained as separate fiscal accounts pursuant to this Regulation, the District may make transfers and/or advances of such funds pursuant to Sections 118-506, 118-508, and 118-509 of the Monterey Peninsula Water Management District Law.

Rule 123. River Management Activities

The following activities fall within the purview of the Carmel River Management Plan and may be undertaken by the District as discretionary acts to the extent River Management Funds are reasonably available. Notwithstanding any other provision of this Rule and except as it may be amended, no river management activity or expenditure of funds shall be undertaken by the Board on or after July 1, 1993.

A. Erosion Control and Prevention.

1. Formulation of Standards - Develop technical standards and a structural master plan to guide all river bank and channel modification projects. Guidelines may (a) set the optimum channel width and bank steepness to depth relationships, (b) address coordination requirements among nearby property owners, (c) evaluate the cost and effectiveness of alternative bank stabilization solutions, (d) establish preferred solutions, (e) define acceptable circumstances and processes for sediment removal, (f) set general engineering requirements for material and design, (g) establish requirements for covering, replanting and maintaining works once completed. Standards shall be reviewed to reflect experience gained during implementation of the program, and (h) establish aesthetic requirements for erosion works.

2. Annual Review - Review aerial photos taken each spring; walk the entire alluvial reach of the river. Review areas that may be subject to erosion during the next storm season.

3. Removal of Hazardous Trees - Identify trees that appear to be diseased or likely to fall into the river. Attempt to effect removal or replacement of such trees where their removal does not conflict with the shade or wildlife requirements.

4. Snag Removal - Remove snags and debris from the

channel, or secure with cables where appropriate.

5. Technical Assistance - Provide technical assistance through staff as follows:

(a) Permits - Coordinate issuance of River Work Permits with the requirements of California Department of Fish and Game and the U.S. Army Corps of Engineers.

(b) Design of Works - Provide design, engineering and construction supervision upon request to landowners proposing riverbank or channel protection projects.

(c) Landowners - Assist landowners to acquire rights of way and assist groups of landowners to select projects by providing information on standards and costs.

(d) Government - Monitor the availability of outside funding and review proposed legislation affecting the program or the interests of the Carmel River.

(e) Funding - Participate in specific River Works projects as feasible and desired by the Board. Financial participation may be partial or full at the discretion of the Board.

6. Project Sponsor - Administer grant funds, donations, and District projects with multiple property owner participation.

7. Construction - Construct riverbank and channel works.

8. Maintenance of Works - Operate and maintain District projects and works related to riverbank and riverbed erosion along the Carmel River.

B. Maintenance of Vegetation.

1. Monitoring - Review annual aerial photos and inspections of the riparian corridor to determine changes in the health of the riparian vegetation. Maintain a file of photos and maps showing changes in the riparian corridor.

2. Planting and Revegetation - Replant areas as needed and prioritize areas for planting. Costs of planting may be borne fully or partially by the District, but no expenditure shall be permitted which exceeds current funds available pursuant to Rule 121.

3. Technical Assistance - Provide technical assistance through staff as follows:

(a) Permits - Assist individuals seeking permits to revegetate and change the vegetation type along the riparian corridor.

(b) Design - Provide design, engineering, and construction suppport upon request to landowners proposing irrigation systems for watering riparian vegetation in the corridor.

4. Construction of Irrigation Systems - Design District irrigation system standards and specifications, and identify reaches where such irrigation is necessary to the health of the riparian corridor. Prioritize areas for irrigation. Irrigation development and construction costs may be borne fully or partially by the District at the discretion of the Board.

5. Operation and Maintenance - Monitor and maintain District irrigation systems. Operation should integrate monitoring of plant health.

C. Inspection.

1. Erosion Control Works - Inspect bank work and channel modification projects to obtain compliance with standards and permit conditions.

2. Vegetation Removal - Monitor activities along the river to prevent unauthorized grading and works.

D. Education.

1. Erosion Works and Prevention - Educate landowners and the general public regarding river management and erosion prevention. Initiate forums with landowners to provide information on the cost, effectiveness and liabilities of bank modification.

2. Vegetation - Assist property owners to encourage planting of desirable species and to discourage removal of vegetation. Provide information on desirable species, spacing and maintenance.

3. Grading - Develop and distribute information on grading.

4. Regulation - Develop and distribute standards and conditions to be met in River Work Permits and Emergency River Work Permits pursuant to Rule 126. Distribute information as to those activities which may be undertaken without a River Work Permit, and activities which are defined as "minor works" pursuant to Rule 126.

E. Research. Research stream geomorphology, erosion potential, fishery and vegetation to understand the system dynamics and to maintain appropriate standards.

F. Easements. Accept and acquire easements needed to provide right-of-way for irrigation systems and access to undertake

works, and accept other property interests deeded to the District.

G. Emergency. Provide emergency response to remove snags and to minimize damage where the river is causing erosion or threatening to erode.

H. Other Related Activities. Manage the riparian corridor, examine sedimentation from non-riparian drainage areas and evaluate culvert design at tributary junctions in conjunction with the Monterey County Department of Public Works. Monitor existing trails for impact upon the riparian corridor. Develop and propose trail standards. Accept River Management funds, grants, and deeds from public and private sources.

Rule 124. River Management and Regulation.

It shall be a violation of these Rules and Regulations, and a misdemeanor pursuant to the Monterey Peninsula Water Management District Law, for any individual to do one or more of the following acts within the riparian corridor without a valid permit issued by this District:

A. Damage, remove, alter, or otherwise injure the riverbank,riverbed, or riparian corridor of the Carmel River,

B. Damage, remove, alter or otherwise injure that portion of any stream, ditch, canal, or reservoir which lies within the riparian corridor of the Carmel River, or take water from any canal, ditch, flume, pipe or reservoir installed or operated by the Monterey Peninsula Water Management District.

C. Damage, remove, alter, or otherwise injure any sprinkler or irrigation system installed or operated by the Monterey Peninsula Water Management District.

D. Damage, remove, alter, deface, or otherwise injure any sign, barrier, or obstruction erected by the Monterey Peninsula Water Management District upon the riverbank or riverbed of the Carmel River, or within the riparian corridor of the Carmel River.

E. Damage, remove, or otherwise injure any tree or willow within or upon the riverbank or riverbed of the Carmel River except for the purpose of planting local willow cuttings less than one inch in diameter to enhance bank cover.

F. Damage, remove, or otherwise injure native vegetation, excluding poison oak, within the riparian corridor.

G. Construct, alter, damage, or otherwise injure any dike, or trail within or upon the riparian corridor.

This rule shall not be construed as applying to the diversion or extraction of water.

Rule 125. River Work Permits.

A. Regular Procedure. River Work Permits shall be required by any person who undertakes riverbank or riverbed protection, riparian vegetation removal, channel modification or activities prohibited by Rule 124 within the riparian corridor, except where such activity is expressly exempt from this permit process in accord with Rule 125 B. Such a permit must be obtained prior to the commencement of any work or activity unless that activity is defined as a "minor work"or unless that activity is an "emergency work". Minor works may be undertaken in accord with the process set forth in Rule 126 A (4) below. Emergency works may be undertaken in accord with the process set forth in Rule 126 B.

B. Permit Exemptions. The District Board may from time to time, upon advice of the Carmel River Advisory Committee, designate River Works which shall be exempt from this permit process, and therefore not be subject to the prohibitions set forth in Rule 124. District staff shall maintain and distribute a list of such exempt activities.

C. Emergency Procedure. Emergency riverbank or riverbed protection or channel modification measures are excepted from the prior requirement for a River Work Permit, provided that the General Manager or District Engineer must first declare such an emergency to exist or to be imminent. Emergency Works Permits shall be processed in accord with Rule 126 B. When declaring an emergency, the General Manager or District Engineer shall take into account the high probability of flooding, erosion danger, blockage and structural damage. During a declared period of emergency, the District must be notified as soon as possible in writing of the type, location and extent of any emergency works. Application for approval shall then be made within 10 days after such emergency works were begun to the Monterey Peninsula Water Management District on forms supplied by the District and, if required by the General Manager or District Engineer, shall be accompanied by appropriate plans.

D. Procedure Where a Life or Property Is Threatened. Should an emergency situation arise that requires immediate bank protection actions to mitigate a clear and present danger to life or property, such actions may be performed without prior approval of the General Manager or District Engineer. Protective measures performed under this subsection shall be limited to those needed to mitigate such clear and present danger to life or property. Such activity shall immediately be communicated to the District, and within ten calendar days of the commencement of such actions the type, location, and extent of protective measures performed under this subsection shall be reported in writing to the District.

Rule 126. Permit Process

A. River Work Permits.

1. Applications for River Work Permits shall be made to the Monterey Peninsula Water Management District on forms supplied by District staff and shall be accompanied by plans showing appropriate site, improvement and engineering information as may be required by District staff. The fee prescribed by Rule 60 shall be required for any River Work Permit.

2. Any application which appears to propose an activity regulated pursuant to the National Flood Insurance Program, including but not limited to:

> (a) grading or changes in land forms that might alter channel hydraulics of the configuration of the floodway, or
> (b) levees or other flood control works that might alter channel hydraulics or the configuration of the floodway,

shall be referred for review and comment to the Monterey County Flood Control and Water Conservation District.

3. A public hearing shall be held by the General Manager or District Engineer on the application after the District Staff determines that the information submitted by the applicant is sufficient to consider the matter; not less than ten (10) calendar days prior to the public hearing the Distict shall give notice of the hearing by one publication in a newspaper of general circulation and by posting notice in conspicuous places close to the properties affected by the application. The General Manager or his delegee shall have sole discretion as to where to post such notice, and a failure to post shall not invalidate the proceedings. The General Manager or his delegee shall also give notice of such hearing by mailing postage prepaid a notice of the time and place of such hearing to persons owning property adjacent to the exterior boundaries of the area actually occupied by the use for which the River Work Permit was applied. Addresses shall be used from the last equalized assessment roll, or alternatively, from such other records of the Assessor or the Tax Collector as contain more recent addresses in the opinion of the General Manager. No hearing shall be required of non controversial minor works.

4. The Board of Directors shall by resolution promulgate upon advice of the Carmel River Advisory Committee a list of "minor works" for which permits, in the absence of controversy, may be granted by the General Manager upon payment of the fee prescribed by Rule 60 witnout publisned notice or public hearing. Minor Work Permits which have been issued shall be prominently posted in the Monterey Peninsula Water Management District office, and shall not become effective until seven (7)

days after issuance. Such permits may be appealed to the Board pursuant to Rule 126 (c) of this regulation. Holders of a Minor Work Permit may undertake such work immediately upon issuance of the permit (but before the permit becomes effective), provided however, that each applicant for a Minor Work Permit who undertakes work prior to the effective date of such permit agrees in writing to proceed during that 7 day period at his own risk, and agrees to indemnify and hold harmless the Monterey Peninsula Water Management District for any damage which may result, and agrees to comply with any Board order should the permit be denied or conditioned on appeal.

5. In order to grant a River Work Permit, an Emergency Permit, or a Minor Work Permit, the General Manager or the District Engineer shall make the following findings based upon facts apparent from the district files, the permit application or facts presented at the hearing:

(a) the work allowed by the proposed permit does not appear to adversely affect adjoining or other properties;

(b) the work allowed appears to be visually compatible with the natural appearance of the river channel, banks and riparian corridor;

(c) the work allowed appears to be appropriate for the intended purpose, and be consistent with technical standards and plans set by the commission;

(d) the establishment, maintenance or operation of the use or work applied for does not appear under the circumstances of the particular case, to be detrimental to health, safety, peace, morals, comfort, and general welfare of persons residing or working in the neighborhood or to the general welfare of the District, and

(e) the work permitted appears either to comply with, or be exempt from the requirements of the National Flood Insurance Program.

Each permit shall briefly set forth or refer to the evidence supporting the findings.

6. The General Manager or the District Engineer may designate conditions in connection with the permit to secure the purposes of this Regulation, in addition to any standard permit conditions which may be required by the Board. The General Manager or the District Engineer may also require bond and guarantees to assure compliance with the conditions.

7. Each permit issued by the General Manager or the District Engineer shall become effective seven (7) days after the date such permit was issued and remain valid until the date of

expiration stated on the permit; or if no date of expiration is stated, or otherwise specified all such permits shall expire one year from the date of granting said permit unless the permitted activity has started within this period.

8. When a property owner wishes to maintain the river channel and/or riverbank on a regular basis, a River Work Permit may be issued by the General Manager or District Engineer upon the approval of an appropriate management plan. River Work Permits for ongoing activity, such as maintenance programs, shall expire one year after an enactment repealing this Rule or Regulation on July 1, 1993, whichever event occurs first. Permits granted for such ongoing activity under this Rule shall state this basis for termination as follows:

> "This permit shall terminate on the date set forth below; and if no date of termination is set, shall terminate one year after the repeal of this Rule or Regulation".

B. Emergency Work Permits. Emergency riverbank or riverbed protection or channel modification measures performed under this Regulation shall require a subsequent Emergency River Work Permit from the General Manager or District Engineer. An application for such a permit shall be submitted within ten (10) calendar days after commencement of such measures. The fee prescribed by Rule 60 shall be required for any Emergency River Work Permit. The intent of such a subsequent Emergency River Work Permit is to ensure that any emergency bank and bed protection measures conform to or will be brought into conformance with the technical standards promulgated in accord with this regulation. To the extent practicable, Emergency River Work Permits shall be administered and granted in accordance with Rule 126A above, and may also be appealed to the Board in accord with Rule 126C. Standards shall be developed and distributed summarizing the design concepts that will be required in emergency permits. Persons undertaking Emergency Works without prior approval shall bear sole responsibility for the adequecy and safety of such work, and shall be deemed to proceed at their own risk. The District, upon later review of the Emergency Work Permit, reserves the right to require removal or modification of such works to that measure compatible with the structural management plan.

C. Permit Appeals. Determinations of the General Manager or the District Engineer may be appealed to the Board of Directors pursuant to Rule 70, "Appeals" upon payment of the fee specified in Rule 63(4).

Rule 127 Limitations.

Notwithstanding any other provision of this Regulation, neither the Monterey Peninsula Water Management District nor their Directors, officers, members, employees or staff shall be

responsible by operation of these Rules and Regulation for the detection, prevention, or mitigation of erosion, floods or flood damage within the Monterey Peninsula Water Management District.

Rule 128 Effective Dates

Notwithstanding any other provision of the Rules and Regulations, Rules 124,125, 126 and 60, subparagraph 60(5),60(6),60(7) shall not be operative or have any force or effect of law until the Board of Directors of the MPWMD adopts a Resolution which acknowledges that the Monterey County Board of Supervisors has amended Chapter 20.108 (title 20-124) of the County Code to avoid the overlapping regulatory jurisdiction with this regulation and states the effective date for any or all of those rules.

Rule 129 Sunset Provisions

Notwithstanding any other provision of this Regulation, Regulation XII and all rules thereunder, shall become revoked by operation of law on July 1, 1993.

Section II. Assessment Appeals. The following Rule shall be added to Regulation VII of the Rules and Regulations of the Monterey Peninsula Water Management District:

Rule 71. Assessment Appeals. Any determination concerning the calculation of a benefit assessment, or concerning the calculation of an assessment credit may be appealed to the Board of Directors. Such an appeal shall be initiated in writing, within fourteen (14) days after the property owner has received notice pursuant to Rule 120 (B)(4) of the final assessment. Such apppeal shall specify in writing the grounds upon which it is taken, reference the provision of these Rules and Regulations violated, and shall be accompanied by the fee prescribed in Rule 63. Within thirty (30) days of receipt of such appeal, the General Manager shall set a hearing on the appeal before the District Board and notify the appellant and/or applicant in writing of the time and place of the hearing at least ten (10) days prior to the hearing and give public notice of the hearing date. An appeal may be filed by the applicant, the General Manager, or any other person. At said hearing the appellant and/or applicant and other persons may present evidence concerning the appeal. The Carmel River Advisory Committee may forward its recommendation regarding this matter. The Board may deny, approve or continue any appeal. Should the Board grant an appeal which seeks an assessment credit for prior works, the Board shall adopt findings consistent with Rule 121 B(3). The General Manager shall notify the appellant and/or applicant within ten (10) days in writing by mail of the Board action taken. Notice of the action taken shall be deemed to have been given when the written notification has been deposited in the mail, postpaid, addressed to the address on the application.

Section III. The following amendments shall be made to Rule 70 of the Monterey Peninsula Water Management District Rules and Regulations:

Rule 70. Appeals - Determinations of the General Manager or the District Engineer may be appealed to the District Board, in writing, within fourteen (14) days after any such determination. Such appeal shall specify in writing the grounds upon which it is taken, and shall reference the provision of these Rules and Regulations which have been violated, and shall be accompanied by the fee prescribed in Rule 63. Within thirty (30) days of receipt of such appeal, the General Manager shall set a hearing on the appeal before the District Board and notify the appellant and/or applicant in writing of the time and place of the hearing at least ten (10) days prior to the hearing and give public notice of the hearing date. An appeal may be filed by the applicant, the General Manager, or any other person. At said hearing the appellant and/or applicant and other persons may present evidence concerning the appeal. The Board may deny, approve or continue any appeal. The General Manager shall notify the appellant and/or applicant within ten (10) days in writing by mail of the Board action taken; namely continuance, approval, conditional approval, or denial. Notice of the action taken shall be deemed to have been given when the written notification has been deposited in the mail, postpaid, addressed to the address shown on the application. Unless the Board otherwise determines, any permit held by a applicant for which an appeal has been filed pursuant to these rules and regulations shall be deemed suspended until the appeal has been resolved.

Section IV. Fees. The following provision shall be added to Rule 60 of the Monterey Peninsula Water Management District Rules and Regulations:

Rule 60 (5) Minor River Works Permit - $10.00
Rule 60 (6) Fee for River Works Permit - $25.00
Rule 60 (7) Emergency River Works Permit - $25.00

Rule 63 (4) Fee for Assessment Appeal - $25.00

Section V. The following miscellaneous changes shall be made to the Monterey Peninsula Water Management District Rules and Regulations:

A. Rule 11 shall have the following definitions added:

"Area of Reduced Benefit": This term shall mean those parcels of real property which front the Carmel River within Zone #3, and which lie between Carmel Bay and the southerly extension of Val Verde Drive. The Area of Reduced Benefit of Zone #3 shall be described as follows:

All of Parcel A of Zone #3 of the Monterey Peninsula Water

Management District, as described in the Engineer's Report, together with;

that part of Parcel B of said Zone #3 lying to the west of a line running approximately north-south across said Zone #3, along the easterly boundaries of parcels 14 and 23 as such parcels are shown on sheet 2 of map of said Zone #3, more particularly described as follows:

beginning at a point on the northerly boundary of said Zone #3 at the most westerly points of the common boundary of Parcel 2 described on Reel 1058, page 116, recorded 12 June 1976, and the 25.086 acre parcel shown on the Record of Survey Map recorded 29 March 1965 in Book 7 of Surveys at page 73, Official Records of Monterey County, CA;

then running southeasterly, turning back northwesterly, and then southwesterly around the easterly side of said Parcel 2 to the common boundary of said Parcel 2 and that parcel of land described on Reel 873, page 443, recorded on 1 October 1973;

then running southerly along the easterly boundary of the parcel described on Reel 873, page 443, to the southerly boundary of said Zone #3.

"Bankworks": Shall means gabions, riprap, revetments or other structural erosion control devices recommended in the Carmel River Structural Master Plan.

"Bed and Banks": Shall mean all that area between the right Riverbank Assessment Line and the left Riverbank Assessment line, which term shall include within it the definitions of "riverbed" and "riverbank" as defined by these Rules and Regulations.

"Native Vegetation": Native vegetation shall mean those plants defined as native vegetation in B.E. Howitt and J.R. Howell (1964) The Vascular Plants of Monterey County, California Wasmann Journal of Biology, Vol. 22, No. 4, or its current supplement a copy of which is available at the District office and is incorporated herein by this reference.

"Riverbank": Shall mean the acclivity or elevated land which forms the boundary of the Carmel River by regularly confining the waters of the stream to their channel. The outer boundary of each riverbank shall be the Riverbank Assessment line; the inner boundary of each Riverbank shall be the hollow, path or channel , defined by these rules as the riverbed, which is formed by the regular and usual flow of Carmel River water. Excluded from the term Riverbank shall be all lands defined as riverbed.

"Riverbank Assessment Line": Shall mean the waterline of the Carmel River during the flow with a recurrence interval of ten (10) years (10 year flood), as determined for the Federal Insurance Administration by Nolte and Associates; the waterline shall be determined by the step-backwater method described in the

United States Geologic Survey Water Supply Paper 1968-A, 1966, "Definition of Stage-Discharge relationship in Natural Channels by Step-backwater Analysis", by J.F.Bailey and H.A.Ray. In those areas where the Riverbank Assessment Line cannot be determined through use of the foregoing criteria, a constructive Riverbank Assessment Line shall be determined by the General Manager based upon interpretating the Spring, 1983 aerial photographs.

"Riverbed": Shall mean the more or less permanent and natural hollow, path or channel over which the regular or usual waters of the Carmel River flow with a recurring or annual interval. The term "Channel" shall be synonomous with the term Riverbed.

"Riparian Corridor" shall mean:
a. All that area which comprises the riverbed and riverbanks of the Carmel River which lies within the boundaries of the Carmel River Management Zone (Zone #3), and
b. All those areas which lie within 25 lineal feet of the riverbank assessment line, excepting however, all lands which lie outside of the Zone # 3 boundary, and exempting lawns, landscaping and cultivated areas as shown on the Spring 1983 aerial photographs taken by the California American Water Company pursuant to the agreement with the District in accord with Rule 123A of this Regulation.

B. Rule 20 shall have the following subparagraphs added:

C. Permit to Undertake Work on Projects Within The Riparian Corridor. Before any individual may undertake any work or project within the riparian corridor, including channel modification, riverbank works, or vegetation removal, such person shall obtain a prior written River Works Permit from the District in accord with Rule 126 B(1) or meet the Emergency River Work Permit criteria of Rule 125 B, or be expressly exempt from the River Work Permit requirement pursuant to Rule 125 A.

C. Rule 24 B shall have the following sentence added:

After making the connection charge calculation detailed above, the General Manager may reduce the connection charge with respect to applications for an amended permit which seek only to enlarge or resize an existing connection. The connection charge reduction shall be a percentage reduction, and shall operate to exact a connection charge only as it relates to the extra increment of water which will be available to the applicant as a function of the enlarged connection.

D. Rule 54 A shall have the following sentence added:

In lieu of the 6 month well report required above, each owner/operator may comply with this rule by submitting a single water production statement on or before the 31st of July, setting forth water production for the full twelve months of the preceding water year.

SUMMARY TABLES OF PROJECT PERPORMANCE

TIME PERIOD: 1958 - 1985 Simulation

PROJECT: Existing

AQUIFER/(NODE): near Carmel gage

CRITERION: River Flow AF/mo

CUTOFF VALUE: 0-30 AF/mo = ≤ ½ cfs/day

NO. MONTHS FAILING: 139 out of 336 (41.4%)

LENGTH OF WORSE SEQUENCE: 20 months in a row

MEAN STORAGE OR (FLOW)

Minimum: 14 AF/mo (sept)

Maximum: 18,999 (mar)

No. Failing Months: 2 (Sept, Oct)

MEDIAN (50% EXCEEDENCE)

Minimum: Ø (aug-nov, 4 mo)

Maximum: 11,403 (mar)

"Average": 3,782

No. Failing Months: 5 (july-nov)

CRITICALLY DRY (90% EXCEEDENCE)

Minimum: Ø (Apr-Jan, 10 mo)

Maximum: 169 (Feb)

"Average": 25

No. Failing Months: 10 (april-Jan)

SUMMARY TABLES OF PROJECT PERFORMANCE

TIME PERIOD: 1958-1985 Simulation

PROJECT: No Project demand @ 20,000 AF

AQUIFER/NODE: near Carmel gage

CRITERION: River Flow AF/mo

CUTOFF VALUE: 0-30 AF/mo ⇒ ≤ ½ cfs/day

NO. MONTHS FAILING: 145 out of 336 (43%)

LENGTH OF WORSE SEQUENCE: 20 months in a row

MEAN STORAGE OR FLOW

Minimum: 12 AF/mo (Sept)

Maximum: 18,830 (Mar)

No. Failing Months: 3 (aug, sept, oct)

MEDIAN (50% EXCEEDENCE)

Minimum: Ø (july-nov, 5 mo)

Maximum: 11,225 (mar)

"Average": 3623

No. Failing Months: 5 (july-nov)

CRITICALLY DRY (90% EXCEEDENCE)

Minimum: Ø (all except Feb, Mar)

Maximum: 152 (Feb)

"Average": 22

No. Failing Months: 10 (all except Feb, Mar)

SUMMARY TABLES OF PROJECT PERFORMANCE

TIME PERIOD: 1958 - 1985 Simulation

PROJECT: 29,000 AF New San Clemente demand = 22,895

AQUIFER/NODE: near Carmel gage

CRITERION: River Flow AF/mo

CUTOFF VALUE: 0-30 AF/mo ⇒ ≤ 1/2 cfs/day

NO. MONTHS FAILING: 39 out of 336 (11.6%)

LENGTH OF WORSE SEQUENCE: 16 months in a row

MEAN STORAGE OR FLOW

Minimum: 325 AF/mo (Sept)

Maximum: 19,370 (mar)

No. Failing Months: Ø

MEDIAN (50% EXCEEDENCE)

Minimum: 470 (Sept)

Maximum: 10,370 (Mar)

"Average": 3,407

No. Failing Months: Ø

CRITICALLY DRY (90% EXCEEDENCE)

Minimum: Ø (aug-dec, 5 mo)

Maximum: 1862 (April)

"Average": 815

No. Failing Months: 5 (aug-dec)

SUMMARY TABLES OF PROJECT PERFORMANCE

TIME PERIOD: 1958 - 1985 Simulation

PROJECT: Existing

(AQUIFER) NODE: AQ3

CRITERION: Usable Storage ⇒ Water table depth

CUTOFF VALUE: 12,000 AF ⇒ 20' depth maximum acceptable

NO. MONTHS FAILING: 49 out of 336 (14.6%)

LENGTH OF WORSE SEQUENCE: 20 months in a row

MEAN (STORAGE) OR FLOW

16,927 = maximum possible

Minimum: 12,161 AF (Oct)

Maximum: 16,199 AF (apr)

No. Failing Months: Ø

MEDIAN (50% EXCEEDENCE)

Minimum: 12,794 (oct)

Maximum: 16,927 (Feb-april)

"Average": 15,210

No. Failing Months: Ø

CRITICALLY DRY (90% EXCEEDENCE)

Minimum: 6876 (Dec)

Maximum: 13,954

"Average": 11,835

No. Failing Months: June-Jan (8 months)

SUMMARY TABLES OF PROJECT PERFORMANCE

TIME PERIOD: 1958-1985 Simulation

PROJECT: No Project @ demand = 20,000 AF

AQUIFER/NODE: AQ3

CRITERION: Usable Storage ⇒ Water Table Depth

CUTOFF VALUE: 12,000 AF ⇒ 20' depth maximum

NO. MONTHS FAILING: 74 out of 336 (22%)

LENGTH OF WORSE SEQUENCE: 21 months in a row

MEAN STORAGE OR FLOW

Minimum: 11,150 (Oct)

Maximum: 15,900 (April)

No. Failing Months: 3 Sept, Oct, Nov

16,927 AF = maximum possible

MEDIAN (50% EXCEEDENCE)

Minimum: 11,850 (Oct)

Maximum: 16,927 (Feb, Mar, Apr)

"Average": 14,772

No. Failing Months: 1 (October)

CRITICALLY DRY (90% EXCEEDENCE)

Minimum: 5550 (Dec)

Maximum: 12,800 (Mar)

"Average": 10,230

No. Failing Months: 10 (all except Mar, April)

SUMMARY TABLES OF PROJECT PERFORMANCE

TIME PERIOD: 1958-1985 Simulation

PROJECT: 29,000 AF New San Clemente (demand = 22,895)

AQUIFER/NODE: AQ3

CRITERION: Usable Storage ⇒ water table Depth

CUTOFF VALUE: 12,000 AF ⇒ 20' depth maximum

NO. MONTHS FAILING: 18 out of 336 (5%)

LENGTH OF WORSE SEQUENCE: 11 months in a row

MEAN STORAGE OR FLOW

Minimum: 15,200 (Sept)

Maximum: 16,600 (Mar)

No. Failing Months: Ø

16,927 AF = maximum possible

MEDIAN (50% EXCEEDENCE)

Minimum: 16,100 (Sept)

Maximum: 16,927 (Dec-April, 5 mo)

"Average": 16,494

No. Failing Months: Ø

CRITICALLY DRY (90% EXCEEDENCE)

Minimum: 11,800 (Oct)

Maximum: 16,450 (Mar)

"Average": 12,931

No. Failing Months: 1 (Oct)

APPENDIX D

State and Federal Air Quality Standards

APPENDIX D

AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards[1] Concentration[3]	California Standards[1] Method[4]	National Standards[2] Primary[3,5]	National Standards[2] Secondary[3,6]	National Standards[2] Method[7]
Oxidant[10]	1 hour	0.10 ppm ($200 ug/m^3$)	Ultraviolet Photometry	—	—	—
Ozone	1 hour	—	—	0.12 ppm ($9235 ug/m^3$)	Same as Primary Standard	Ethylene Chemiluminescence
Carbon Monoxide	8 hour	9.0 ppm ($10 mg/m^3$)	Non-Dispersive Infrared Spectroscopy (NDIR)	$10 mg/m^3$ (9 ppm)	Same as Primary Standards	Non-Dispersive Infrared Spectroscopy (NDIR)
	1 hour	20 ppm ($23 mg/m^3$)		$40 mg/m^3$ (35 ppm)		
Nitrogen Dioxide	Annual Average	—	Gas Phase Chemiluminescence	$100 ug/m^3$ (0.05 ppm)	Same as Primary Standard	Gas Phase Chemiluminescence
	1 hour	0.25 ppm ($470 ug/m^3$)		—		
Sulfur Dioxide	Annual Average	—	Ultraviolet Fluorescence	$80 ug/m^3$ (0.03 ppm)	—	Pararosaniline
	24 hour	0.05 ppm ($131 ug/m^3$)[9]		$365 ug/m^3$ (0.14 ppm)	—	
	3 hour	—		—	$1300 ug/m^3$ (0.5 ppm)	
	1 hour	0.5 ppm ($1310 ug/m^3$)		—	—	
Particulates	Annual Geometric Mean	$30 ug/m^3$ PM[11]	High Volume Sampling	$75 ug/m^3$	$60 ug/m^3$	High Volume Sampling
	24 hour	$50 ug/m^3$ PM[11]		$260 ug/m^3$	$150 ug/m^3$	
Sulfates	24 hour	$25 ug/m^3$	Turbidimetric Barium Sulfate	—	—	—
Lead	30 day Average	$1.5 ug/m^3$	Atomic Absorption	—	—	—
	Calendar Quarter	—	—	$1.5 ug/m^3$	Same as Primary Standard	Atomic Absorption
Hydrogen Sulfide	1 hour	0.03 ppm ($42 ug/m^3$)	Cadmium Hydroxide-STRactan	—	—	—
Vinyl Chloride (Chloroethene)	24 hour	0.010 ppm ($26 ug/m^3$	Tedlar Bag Collection, Gas Chromatography	—	—	—
Visibility Reducing Particles	1 observation	In sufficient amount to reduce the prevailing visibility[8] to less than 10 miles when the relative humidity is less than 70%				

Pollutant	Averaging Time	California Standards[1] Concentration[3]	California Standards[1] Method[4]	National Standards[2] Primary[3,5]	National Standards[2] Secondary[3,6]	National Standards[2] Method[7]
APPLICABLE ONLY IN THE LAKE TAHOE AIR BASIN:						
Carbon Monoxide	8 hour	6 ppm ($7 mg/m^3$)	NDIR	—	—	—
Visibility Reducing Particles	1 observation	In sufficient amount to reduce the prevailing visibility to less[8] than 30 miles when the relative humidity is less than 70%		—	—	—

[1] California standards, other than carbon monoxide, are values that are not to be equaled or exceeded. The carbon monoxide standards are not to be exceeded.

[2] National standards, other than ozone and those based on annual averages or annual geometric means, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days a calendar year with a maximum hourly average-concentration above the standard is equal to or less than one.

[3] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 mm of mercury. All measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of Hg (1,013.2 millibar); ppm in this table refers to parts per million by volume, or micromoles of pollutant per mole of gas.

[4] Any equivalent procedure that can be shown to the satisfaction of the Air Resource Board to give equivalent results at or near the level of the air quality standard may be used.

[5] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health. Each state must attain the primary standards no later than three years after that state's implementation plan is approved by the Environmental Protection Agency (EPA).

[6] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a "reasonable time" after the implementation plan is approved by the EPA.

[7] Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.

[8] Prevailing visibility is defined as the greatest visibility that is attained or surpassed around at least half of the horizon circle, but not necessarily in continuous sectors.

[9] At locations where the state's standards for oxidant and/or suspended particulate matter are violated. National standards apply elsewhere.

[10] Measured as ozone.

[11] PM refers to particulate matter of 10 microns or less in size.

APPENDIX E

Population and Employment Projections

APPENDIX E

2 HOUSING AND EMPLOYMENT GROWTH PROJECTIONS

2.1 DISTRICT-WIDE SUMMARY

District-wide, housing units and employment opportunities have been growing at average annual rates of 1.3% and 4.3%, respectively, for the past five years. Growth in future years would be slower than that of the recent past. Assuming growth as planned, housing would increase at an annual average rate of 0.6% for the next 35 years; the net effect of this growth would be to enlarge the housing stock by about 22%. If growth is constrained by lack of water or other infrastructure, housing development would be limited to about 0.6% per year during the years 1985-2000 and about 0.09% during the years 2000-2020. The net increase in the housing stock would be 12% after 35 years (Exhibits 1 and 2).

Growth as planned demonstrates that regional employment increases would amount to about 2.2% per year 1985-2000 and 1.1% per year 2000-2020. Annual increases during these time frames would be about 1.1% per year and 0.05% per year, respectively, if growth is restricted by lack of water. Net expansion in the regional employment base would amount to 12% (constrained) or 60% (planned) of the existing amount (Exhibit 3). Growth discussions are often framed in terms of a balance between jobs and housing. Obviously, when jobs and housing are out of balance, quality of life suffers because of the necessity of long commutes to work, attendant increases in air pollution and noise, and loss of leisure time for workers and other motor vehicle occupants. However, no single community on the Monterey peninsula can expect to provide jobs for every resident or a home for every worker, because some people will always choose to live in an area that is different from their workplace. However, when the region as a whole provides a balance of housing and jobs, some of the most frustrating aspects of growth can be substantially mitigated.

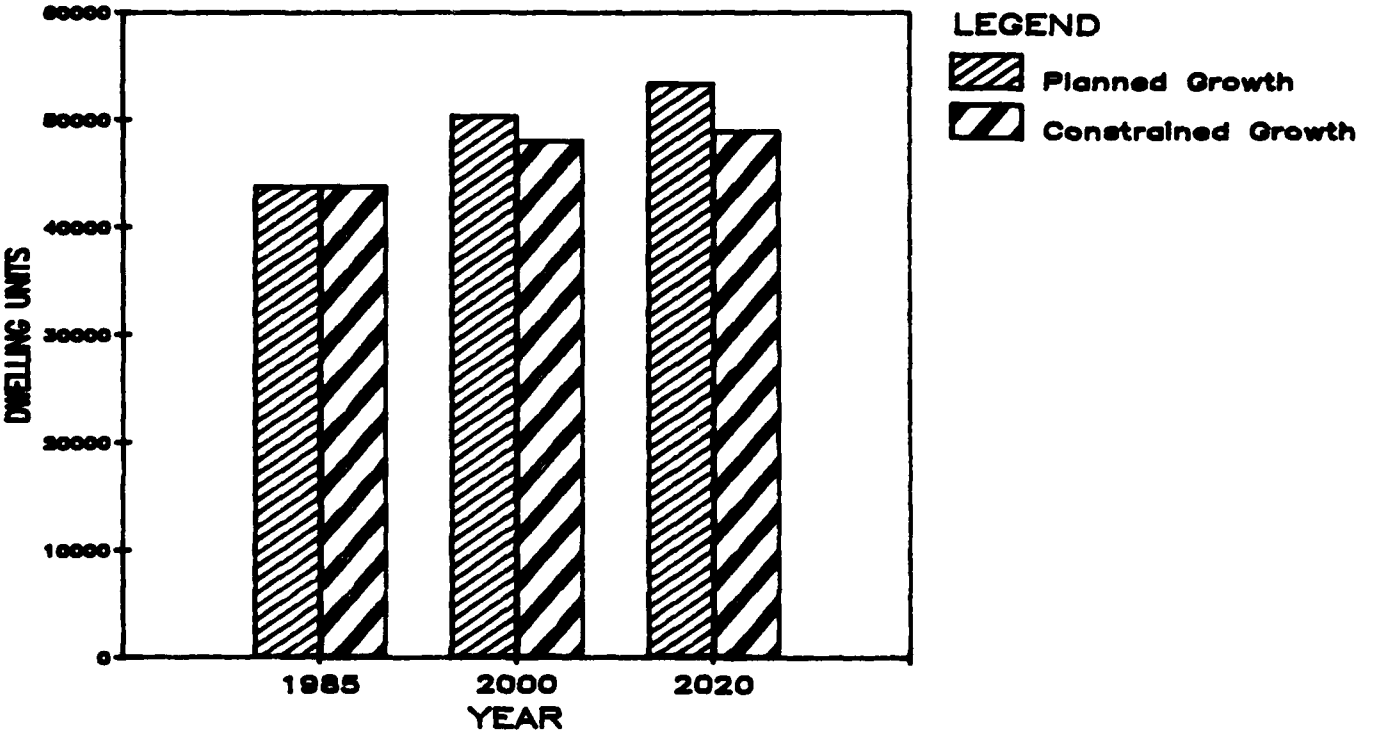
EXHIBIT 1

MPWMD SERVICE AREA GROWTH AND WATER USE PROJECTIONS

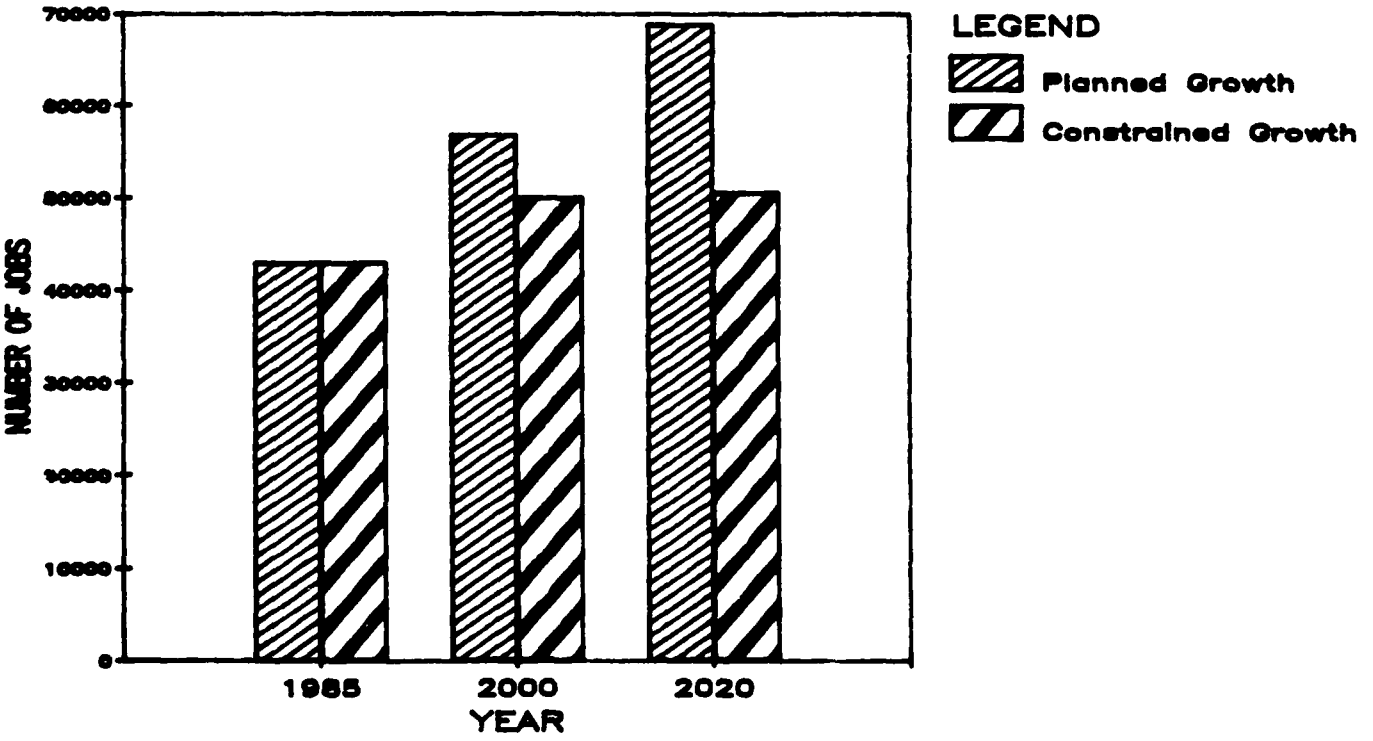
Indicator	Area	Base 1985	Projected Without Dam	Projected With Dam
Dwellings (Residences)	CALAM	42,231	47,380	51,182
	Non CALAM	1,640	2,261	2,261
	MPWMD	43,871	49,641	53,443
Population (# Residents)	CALAM	92,807	104,029	112,186
	Non CALAM	3,863	5,123	5,123
	MPWMD	96,670	109,152	117,309
Employment (# Jobs)	CALAM	42,938	48,661	65,951
	Non CALAM	30	2,247	2,247
	MPWMD	42,968	50,908	68,198
Water Use (Acre-Feet)	CALAM	17,465	20,040	23,002
	Non CALAM	2,739	3,070	3,070
	MPWMD	20,204	23,110	26,072
Hotel Units (# Rooms)	CALAM	6,878	9,669	12,865
	Non CALAM	0	150	150
	MPWMD	6,878	9,819	13,015

Sources: EIP Associates
Monterey Peninsula Water Management District

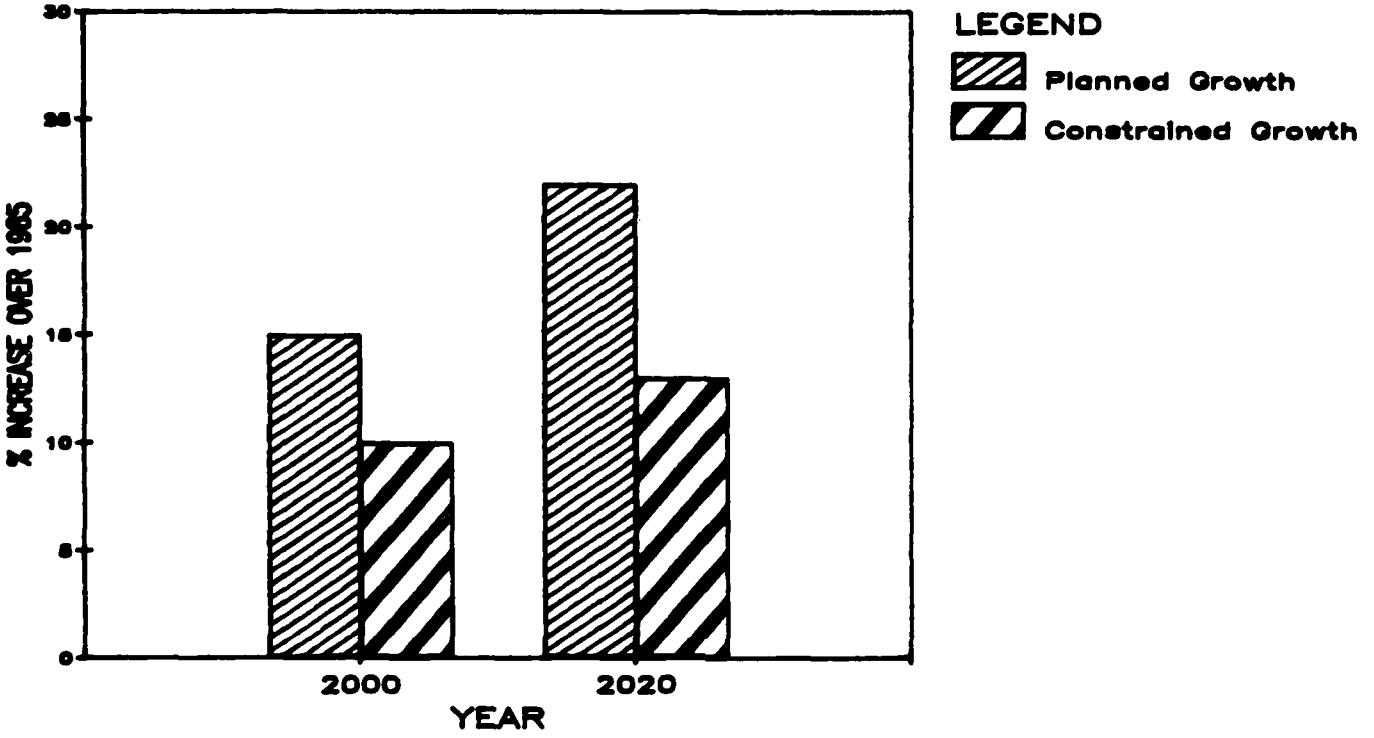
MPWMD SERVICE AREA GROWTH PROJECTIONS 1985–2020 DWELLING UNITS



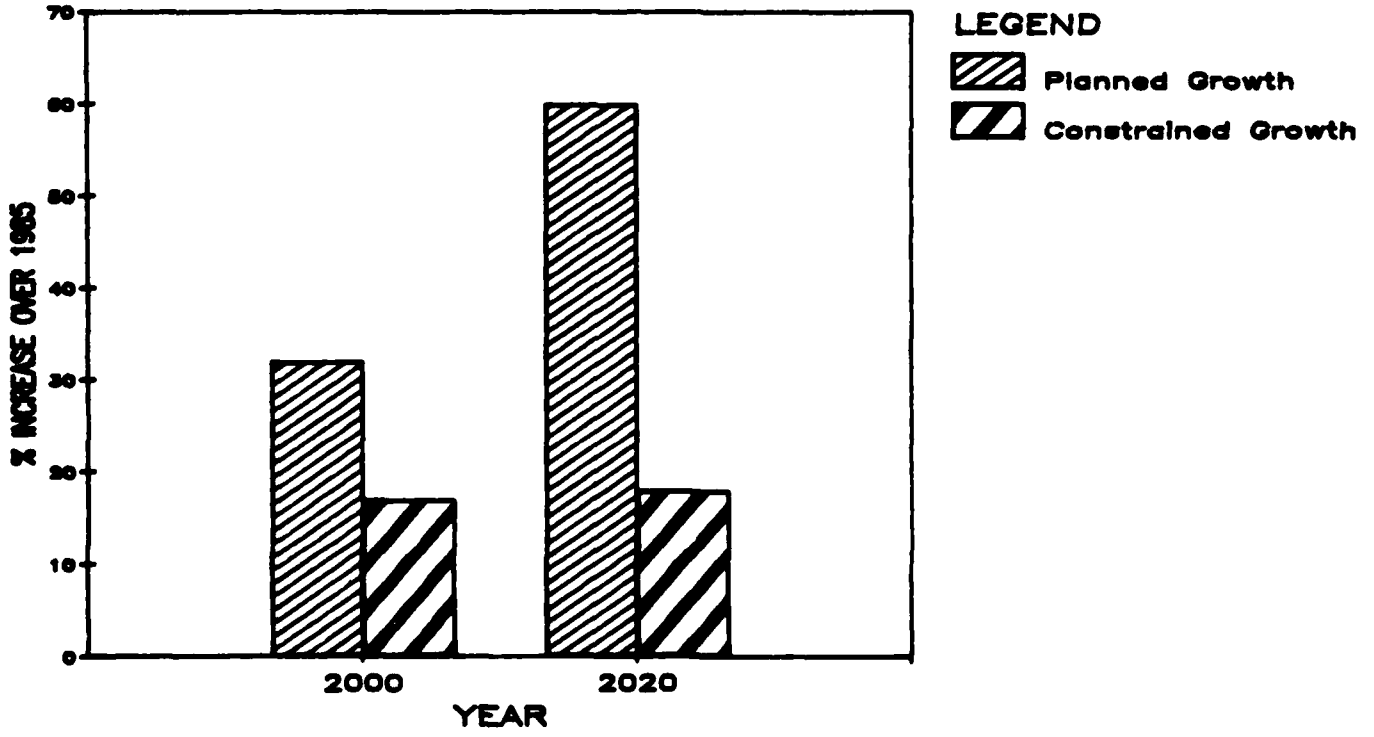
MPWMD SERVICE AREA GROWTH PROJECTIONS 1985–2020 EMPLOYMENT



MPWMD SERVICE AREA
PROJECTED % INCREASE OVER 1985 LEVELS
DWELLING UNITS



MPWMD SERVICE AREA
PROJECTED % INCREASE OVER 1985 LEVELS
EMPLOYMENT



Individual City analyses regarding jobs and housing at present and through the year 2020 appear later in this report. Summarizing these analyses into one peninsula-wide table provides information that forms the base of the discussion regarding a regional jobs/housing balance. In 1980, the number of employed residents per peninsula household was about 1.02:1. This means that, on average, slightly more than one worker supported the average household. This ratio of employed residents to households changes over time, depending on a variety of economic conditions. The price of peninsula housing relative to other housing and the percentage of women in the workforce are two variables that affect the number of employed residents per household. This analysis lacks the complex economic model to project changes in the ratio of employed residents per household and, therefore, assumes that it remains constant for each community through the year 2020. Also in 1980, census and other data showed that there were about 0.86 jobs for every dwelling unit in peninsula communities.

Jobs and housing would be in balance when these two indicators -- employed residents per household and jobs per household -- are the same. The reasons that these two indicators were not in balance in 1980 could include commuting to inland or northern communities to work; a large retired or student population that does not work but nevertheless lives in peninsula households; and a high housing vacancy rate due to the number of second or vacation homes located on the peninsula.

Growth projections for peninsula communities emphasize jobs more than housing so that, by the year 2020, the jobs:housing ratio could increase to 1.29:1, assuming planned growth, or 1.03:1, assuming constraints to growth. The result of this changing trend will be increased in-commuting from the Salinas area to the peninsula.

2.2 PROJECTION METHODOLOGY

The growth projections derived from a variety of sources that includes previous growth studies, land use and zoning information provided by the County and the Cities involved, building construction data, and review by the local jurisdictions.

The Association of Monterey Bay Area Governments (AMBAG) is a regional planning agency whose jurisdiction spans both Monterey and Santa Cruz Counties. AMBAG has authored several studies that provided a basis for the development of this report.[1,2]

AMBAG has collected census and other data in the course of developing buildout projections for local jurisdictions; the AMBAG projections provided a necessary check on the forecasts presented in this report. It should be noted that the projections presented here are based on land use and zoning in each jurisdiction. These projections differ from the AMBAG forecasts, which are based on an economic/demographic model that is driven by assumptions about market conditions and birth, death and fertility rates. The EIP projections for the year 2020 are higher than AMBAG's for each of the cities but lower overall in the peninsula due to a much lower projection in the County.

In order to assist the District in determining the optimal size for the proposed dam, Recht Hausrath & Associates (RHA) prepared growth projections in each of the Cities and County areas of the Monterey Peninsula in 1980 and updated that information in 1984.[3,4] These projections incorporated U.S. Census data in detailing the amount of employment and single-family and multi-family housing that existed in each jurisdiction in 1980. For each City and County area, RHA examined land availability, local land use policy, the strength of market demand for new development and existing infrastructure capacity in order to forecast growth during the 20-year periods of 1980-2000 and 2000-2020.

EIP further updated RHA's most recent information through a a survey of building construction activity from 1980 through 1985 in each City and the local part of the County. For the construction activity survey, each jurisdiction provided data documenting housing development from 1980 to 1985. In addition, EIP examined construction permits, site plans, maps, aerial photographs and other material from building department files in order to estimate commercial and industrial growth during the same five-year period. After determining the size and type of net new commercial construction (building demolitions were subtracted from new construction and remodeling was not included), standard employment density factors for retail, office, restaurant, hotel and industrial uses were applied to the square footage estimates to allow an estimate of employment growth.

Land availability data and review of each jurisdiction's most recent land use plans and other policy documents provided the core of information necessary to make detailed growth projections. These projections include separate figures for hotel and golf course employment because of their unique demands on water, wastewater and road systems.

Hotels, in addition to being water-intensive commercial uses, generate service demands beyond what would be expected from other places of employment. Golf courses were separated out because of their unique position of being able to use reclaimed wastewater rather than potable water for irrigation.

The projections also provide separate growth forecasts for each jurisdiction according to planned growth and growth constrained by lack of water. The only constraint assumed in this report is that of water availability.

Each City dependent on District water is allocated a certain amount for annual usage; the District and the Cities keep records of the unused allocation to date. Because of the current shortage of water for new development, each peninsula City has also has adopted a water allocation policy that specifies how much of the unused water allocation will be available to serve different types of new development. For the constrained growth scenario, the projections assume that development will occur in accord with each City's water allocation policies up to the limit of water available to that City; then development in that jurisdiction will stop. For the planned growth scenario, the projections rely more heavily on land availability data and current land use policy.

After the growth projections were drafted, the District, the individual Cities and the District's Technical Advisory Committee (TAC) -- which includes members of City and County government and AMBAG -- were given several opportunities for review and comment. After TAC review and subsequent revision of the projections, each jurisdiction's representative sought City Council or Board of Supervisors adoption of the growth projections.

2.3 PROJECTIONS BY JURISDICTION

Growth projections for the Cities and County areas within the Monterey Peninsula Water Management District and the Cal Am Service Area appear in Tables A-1 to A-8 in Appendix A. Sources and explanations for the data are provided as footnotes to the tables. This section summarizes the growth projections by jurisdiction and details the individual data sources used during development of the projections.

2.3.1 CITY OF CARMEL-BY-THE-SEA

The City's Housing Element and General Plan provided 1980 housing and employment information. In addition, the City's search through building department records provided data for estimating growth since 1980. City information about recent construction and employment growth trends helped shape both the short-term and long-term projections for the planned growth scenario, and the City's water allocation policy guided the development of the constrained growth projections. The water allocation policy favors single-family housing construction over multi-family housing; that policy also states that no water is available for additional commercial development, unless water conserved by other commercial uses is made available to the new development. Current City policy holds that there will be no increases in hotel rooms in Carmel, with or without a dam.

The 1985-2000 rate of housing growth planned is projected to rise from the 1980-85 rate of .42% per year to .53% per year; after the turn of the century, housing construction will slow slightly to .35% per year. The effective increase in housing by the year 2020 would be about 12% more than that existing in 1985. Without dam construction, housing growth would be expected to be only .36% per year from 1985-2000, with none constructed after the year 2000. Under this scenario, the housing stock would increase by only 5% in the next 35 years.

Assuming Carmel development as planned, employment is expected to grow an average of .7% per year for the 35-year study period, with jobs increasing a total of 25% above existing levels. No significant job growth is expected without an additional water supply.

U.S. Census information shows that, in 1980, there were 0.7 employed residents per household. In that same year, Carmel provided 1.1 jobs for every household in the City. These figures indicate that there are significantly more jobs in Carmel than are necessary to support the citizens living there. Growth as planned shows a continued emphasis on jobs rather than housing; over the 35-year forecast period, Carmel would be expected to provide 2.3 jobs for every home constructed. By the year 2020, the jobs:housing ratio would increase slightly from the present 1.1:1 to 1.2 jobs for every household. If growth is constrained, housing production is expected to continue but job generation is not; therefore, the jobs:housing ratio would decline over the next 35 years to 1.04:1.

2.3.2 CITY OF DEL REY OAKS

City and U.S. Census information provided the base for 1980 and 1985 housing and employment figures. Most growth projected for the future is limited to current development proposals; the City is constrained from additional growth by a lack of developable land. Assuming that the water supply is not augmented by the dam, all the currently proposed housing would develop but commercial construction would be cut back because of the limits on the City's water allocation.

Assuming dam construction, the City's housing supply is expected to grow at an average rate of 0.9% per year over the next 35 years, much faster than the negligible increases that occurred over the past five years. By the year 2020, the housing stock will have increased by 33%. If growth is constrained, the average growth rate would be about 0.7% per year and the total housing supply would increase by a total of 26%.

With an increased water supply, the City employment is expected to increase at an annual rate of about 4.1% per year 1985-2000, slowing to about 0.3% per year 2000-2020. Employment growth rates over the past five years have averaged 3% per year. "Planned growth" projections show the total employment base increasing by about 71% over the next 35 years, versus the 47% growth that is likely to occur with constrained growth. If the water supply is increased, employment growth rates through the year 2000 would be about the same as those that occurred over the past five years; however, after the turn of the century, little or no commercial development could occur without an augmented water supply.

Although the City's 1980 ratio of jobs to housing was 0.7:1 in 1980, there were approximately 1.2 employed workers per City household at that time. These statistics reinforce assumptions that the City provides a home to many workers employed in surrounding communities. The jobs:housing ratio increased slightly by 1985 to 0.8:1. The projections for both scenarios show higher jobs:housing ratios in the future; by the year 2020, the City would be expected to have 1.1 jobs per household (planned) or 1.0 jobs per household (constrained).

2.3.3 CITY OF MONTEREY

City documents were important in developing the growth projections as well as providing figures that note existing development. A search through building department records provided information about the most recent development in the City. The planned growth scenario uses information from the General Plan and the Presidio Master Plan to project short-term housing growth; however, General Plan forecasts were reduced by 25% to reflect recent changes in zoning standards. Assuming constrained growth, housing development would be cut by half in order to comply with existing water allocations.

Employment growth (assuming dam construction) is primarily expected to occur under current development proposals, including some hotel expansion already approved. Without sufficient water, this development would be constrained by nearly 50%; no additional commercial development would be expected after the turn of the century.

If growth occurs as planned, housing construction would increase the supply by about 10% over the 35-year planning period, an average increase of 0.3% per year. This rate is significantly less than the 1.7% average rate over the past five years. Under the scenario of constrained growth, the City's housing stock would be expected to increase by only 5% during the next 35 years.

Employment growth is expected to occur at a decreasing rate over the next 35 years, but the total jobs in the City would increase by 14% to 52% by the year 2020, depending on the status of the water supply. In recent years, employment opportunities have expanded at an average annual rate of 2.4%; with planned growth, this rate would slow to 1.9% during the 1985-2000 period and would slow further to 0.9% between 2000 and 2020. Without an increase in the amount of water available to serve new development, the employment growth rate would be expected to be 1.0% before 2000 and 0% thereafter.

The City is clearly the dominant employment center on the peninsula, providing nearly 60% of all jobs in the area. The City's jobs:housing ratio of 1.9:1 is nearly twice as high as the number of employed residents per household, which is 1.0. Both scenarios of growth show continued emphasis on commercial development; over the 35 years, the City would provide 5.6 to 9.9 jobs for every home built. By the year 2020, the jobs:housing ratio could be 2.0:1 (constrained) or 2.6:1 (planned).

2.3.4 CITY OF PACIFIC GROVE

The housing growth projections for the City hinged on the estimate that, aside from current development applications, only 75% of the City's vacant lots would build out. Assuming water supply constraints, however, even less housing construction would occur; in this case, the City's water allocation policy formed the base for the projections.

Employment growth projections were based on several factors, including the RHA study of market demand for hotel rooms, City Council/Chamber of Commerce development potential estimates, and the City's records of proposed commercial construction. Commercial development would also be constrained by more than 50% if the water supply is not expanded; for the without-dam scenario, the projections rely upon the City's water allocation policy.

Assuming planned growth, housing development would be expected to increase in the future twice as fast as it has over the past five years, with a net effect of increasing the housing supply by 25% by the year 2020. Assuming constrained growth, the housing supply would be expected to increase by only 9%, at an annual average rate half that of recent history.

Employment growth is expected to occur at a decreasing rate in the future under both scenarios. The net effect would be a jobs increase of 9% or 34% by the year 2020, depending on water availability.

Pacific Grove provides more workers than jobs to the peninsula economy, with 1.0 employed residents per household and a ratio of jobs to housing of only 0.55:1. The growth projections do not change this balance significantly; by the year 2020, the jobs:housing ratio is expected to remain 0.55:1 (constrained) or increase slightly to 0.59:1 (planned).

2.3.5 CITY OF SAND CITY

The City's Housing Element gives the number of both houses and jobs in the City in 1980; these figures were updated to the present by reviewing recent building permit activity. The City's Local Coastal Plan (LCP) contains information about the zoning and development plans of vacant parcels; this material guided the projections of commercial

and housing growth for both scenarios. Assuming planned growth, the projections include nearly all the housing units allowable under the zoning; commercial development is expected to occur on other vacant parcels at densities common in other peninsula Cities. If sufficient water is not available, the analysis allocates the City's available water to housing and commercial construction according to the emphasis the LCP places on each, prior to calculating dwelling units and jobs that would develop.

Projections for Sand City's growth show the most dramatic increases of any of the Cities on the peninsula. Assuming planned growth, average annual housing stock increases would amount to 30% per year; by the year 2020, the total amount of housing in the City would be more than ten times the present amount. If growth is constrained, there would still be a housing boom in the City, but total housing by 2020 would be only five times the amount of housing at present.

Employment growth would also be strong in future years but would not increase at a rate as fast as housing. By the year 2020, the amount of jobs in the City could nearly triple, assuming a dam increases the water supply. With water supply levels constant, jobs would still increase by more than 50% in Sand City.

Sand City currently has a much higher number of jobs provided than places to live. In 1980, the jobs:housing ratio was the highest on the peninsula at nearly 13:1 and, by 1985, the ratio increased to 14.1:1. However, there was an average of only 1.01 employed residents in each household in 1980. Both sets of projections show more balanced growth in the City in the future. By 2020, the City can expect to sustain a jobs:housing ratio of 3.5:1 (constrained) or 4.5:1 (planned).

2.3.6 CITY OF SEASIDE

The housing projections for the City are based upon development proposals on file with the planning department plus information provided about the number of vacant residential lots of record. In addition, the analysis incorporates data from two AMBAG reports, the Systems Capacity Analysis and the Regional Housing Needs Report. Assuming development as planned, Seaside will probably reach AMBAG's stated "buildout" level by the year 2020. With constrained growth, this amount would be cut back somewhat, although some planned housing development will not be curbed because of the possibility of using groundwater supplies.

Employment growth forecasts incorporate data from several other reports, including RHA's Future Hotel Rooms Demand Study for the City of Monterey and the City of Seaside's Economic Development Strategy Plan.

Housing supply has been increasing at a rate of about 0.3% per year. Assuming planned growth, the rate of housing increase would triple in the years 1985-2000 before falling back to 0.2% in the 20 years after the turn of the century. By the year 2020, total housing stock would have increased by 17%. If growth is constrained, the housing supply could be expected to increase by only about 8% over the next 35 years.

Employment growth rates would double in the near future, assuming planned growth, from 1.9% in the years 1980-1985 to 3.9% 1985-2000, before slowing to a more modest 1.6% 2000-2020. The net effect of this pace of job expansion would be to double the existing employment base. If growth is slowed due to constraints, the growth rate would drop to 1.1% through the end of the century, then perhaps halt completely. After 35 years, the City's job base would increase by only 17%.

Seaside is another of the communities that provide more housing than jobs. In 1980, approximately 1.3 employed workers lived in each household, yet the City provided only 0.5 jobs per household. Regardless of growth scenario, the City's future emphasis is on employment generation; by the year 2020, the jobs:housing ratio would increase to 0.9:1 (planned) or 0.6:1 (constrained).

2.3.7 UNINCORPORATED PART OF THE COUNTY OF MONTEREY, CAL AM SERVICE AREA

Census tract counts and County information provided 1980 data on housing and employment amounts. County records also provided the growth increment from 1980 to 1985. Development proposals on file with the County planning department, the RHA economic forecasts and general plan policy data all formed the basis for projections of both housing and commercial construction in unincorporated areas. Housing has increased at an average annual rate of about 0.5% per year for the past five years. With planned growth, this rate would increase slightly to about 0.7% per year; with constrained growth, this rate would decrease slightly to about 0.4% per year. The net effect on the housing supply would be a total increase of about 14-23%, depending on water availability.

Employment is expected to increase by about 2.2% per year from 1985-2000 and 0.9% per year 2000-2020, assuming planned growth. Assuming constrained growth, these growth rates would be much lower at 1.6% and 0.6%, respectively. The net effect on local employment would be to expand the job base by 38-57%.

As would be expected, the unincorporated areas house a significant portion of the workers employed elsewhere. In 1980, Census data showed that approximately 1.2 employed residents lived in every County household. At the same time, the unincorporated areas provided only 0.31 jobs for each home provided. Projections for the future show that this ratio would change somewhat by the year 2020; if growth occurs as planned, there would be slightly more jobs provided than if growth is constrained, but the overall housing balance would differ little from one scenario to another. The jobs:housing ratio in 2020 could range from 0.36:1 to 0.38:1.

2.3.8 UNINCORPORATED PART OF THE COUNTY OF MONTEREY, NON-CAL AM SERVICE AREA

County data provided the majority of information regarding current development levels and the potential for future development in the non-Cal Am area as well as in the Cal Am service area.

Because this area is not served by Cal Am water, the projections with planned and constrained growth without a dam are the same. Housing is expected to increase at a rate greater than the 1.9% annual average of the recent past; by the year 2020, the area's housing stock would increase by a total of 73%. Few employment opportunities have occurred in this area in the past, so comparison of growth rates may not be very meaningful. However, the current 30 jobs would be expected to increase to an employment base eight times the present size by the year 2020.

Because of the lack of employment opportunities in this portion of the County, the jobs:housing ratio is currently 0.04:1. 1980 Census data show, however, that approximately 1.2 employed County residents live in each house in the area. The jobs:housing ratio would increase over the next 35 years, according to the projections, and would be approximately 0.19:1 by the year 2020.

[1]Association of Monterey Bay Area Governments, "Regional Population and Employment Forecast: 1980-2020," November 1984.

[2]Association of Monterey Bay Area Governments, "Regional Housing Needs Report: 1980 to 1990," adopted March 14, 1984.

[3]Recht Hausrath & Associates, "Economic and Demographic Projections," prepared for the Monterey Peninsula Water Management District, October 1980.

[4]Recht Hausrath & Associates, "Socioeconomic Impacts of the Proposed San Clemente Dam--Growth Impacts: Housing and Employment Forecasts With and Without the Proposed Project," prepared for the Monterey Peninsula Water Management District, June 1984.

APPENDIX F

Archaeological Report

APPENDIX F

ARCHAEOLOGICAL CONSULTING

P.O. BOX 3377
SALINAS, CA 93912
(408) 422-4912

ARCHAEOLOGICAL AND HISTORICAL INVESTIGATIONS FOR THE SAN CLEMENTE DAM EIR/EIS, CARMEL VALLEY, MONTEREY COUNTY, CALIFORNIA

by

R. Paul Hampson, *SOPA* and MaryEllen Ryan

with contributions by
Gary S. Breschini, *SOPA* and Trudy Haversat, *SOPA*

May 4, 1987

Prepared for
Monterey Peninsula Water Management District

Note: *SOPA* indicates certification by the Society of Professional Archaeologists

ABSTRACT

The following report incorporates National Register nomination recommendations for sites located, recorded, and discussed during two previous phases of the Section 106 compliance process for a proposed replacement dam at the San Clemente Reservoir, located in the upper Carmel River drainage, Monterey County, California. Construction of the dam is proposed by the Monterey Peninsula Water Management District and this report was prepared on their behalf.

Archival research and field investigations reported herein have resulted in recommendations for the nomination of four sites to the National Register of Historic Places. These recommendations include the existing San Clemente Dam (CA-MNT-1248H) and the earlier Carmel Dam (CA-MNT-1249H), as well as two stone cabins (CA-MNT-812H and -813H).

CONTENTS

INTRODUCTION

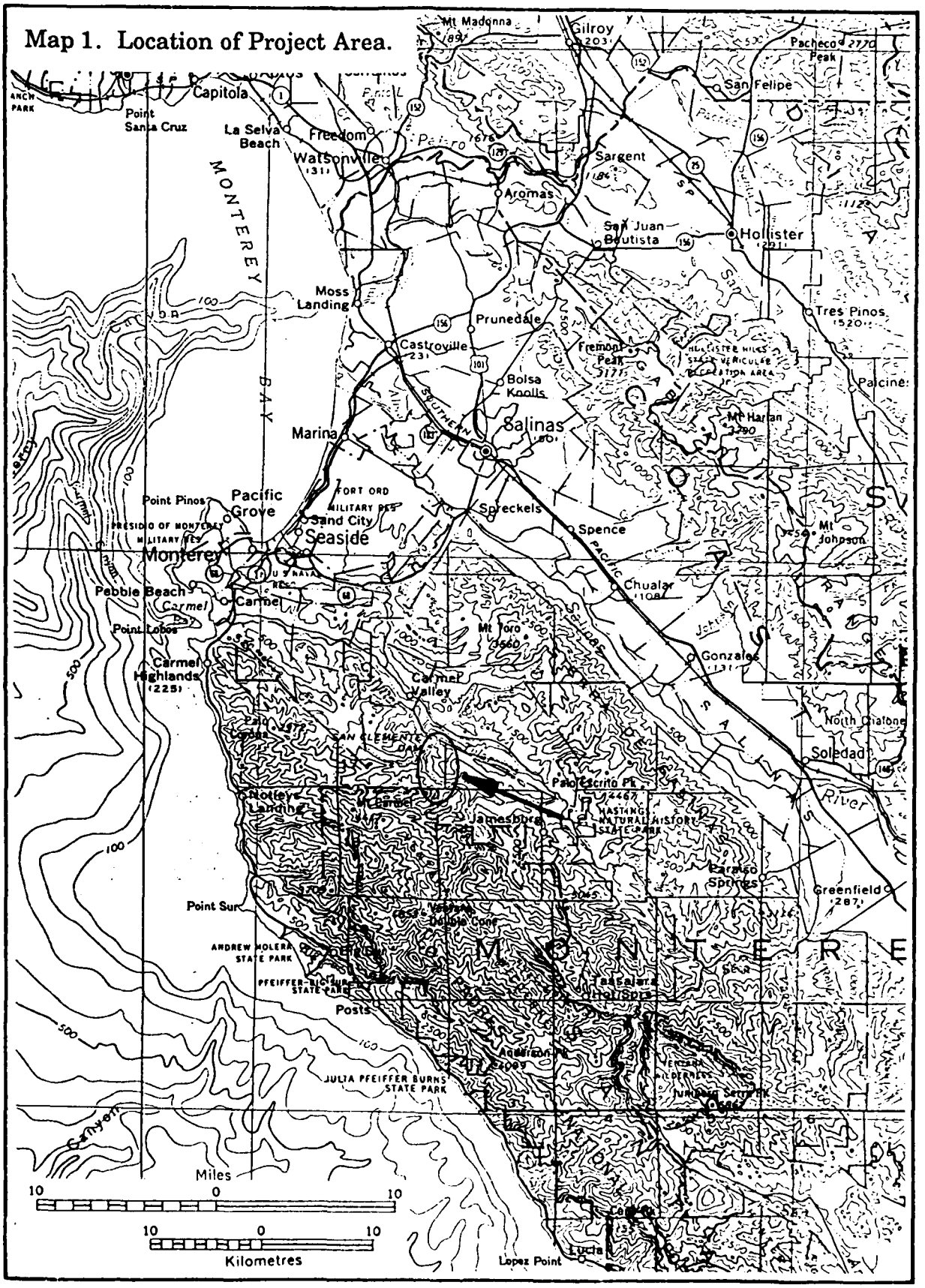
The project proposed by the Monterey Peninsula Water Management District calls for replacement of the current 1920 San Clemente Dam in the Upper Carmel Valley with a new dam to be constructed downstream from the current site. The proposed dam would create an impoundment of Carmel River waters of 29,000 acre feet at the 662 foot elevation. Construction would inundate a number of historic sites as well as prehistoric sites and features, including the 1920 San Clemente Dam and the 1883 Carmel Dam. As required by the Historic Preservation Act of 1966 and amendments, the National Environmental Preservation Act of 1966, and other sections of Federal law and regulation, the district called for preparation of an Environmental Impact Statement. The current investigations are a part of the Environmental Impact process, and consist of research carried out prior to and during field investigations to determine the significance of known historic and prehistoric resources documented in the project area (Breschini 1987). Following a general survey and historical overview of the greater study area in 1973-1974 (Edwards et al. 1974), a preliminary field and literature investigation of cultural resources to be impacted by the proposed new dam construction was carried out by WESTEC Services, Inc. in 1983 (WESTEC Services, Inc. 1984). WESTEC recommended that, in addition to minimal subsurface testing and further site recordation, additional archival research be conducted in order to determine if the resources met eligibility criteria for the National Register of Historic Places.

The following report presents additional information derived from a variety of primary historical sources and field investigations for each of the sites under review, and makes recommendations for National Register eligibility. The report is based on investigations performed under the following scope of work (cf. Breschini 1987:3-5):

Scope of Work

The Scope of Work is based on recommendations made by WESTEC (1984). It includes the following investigations:

Map 1. Location of Project Area.



Background Research

The background research may include (where required) investigations such as title searches, preparation of prehistoric or historical overviews, archival research, interviews, etc.

Specific facilities or resources which probably will be used during the archival research include the Map Room at the McHenry Library, University of California, Santa Cruz, and the files and records of the Pebble Beach Company in Pacific Grove. It is possible that a title search will have to be conducted using County records and documents available at the Monterey County Court House in Salinas. Finally, documents in libraries and other collections on the Monterey Peninsula and in Salinas probably will have to be examined.

Also, a background literature search, as required by state guidelines and current professional standards, will be conducted at the Regional Information Center of the California Archaeological Inventory, located at Sonoma State University, Rohnert Park, California.

These literature searches are undertaken to determine if there are any previously recorded archaeological resources within the project area, and whether the area has been included within any previous archaeological research or reconnaissance projects. Following completion of the project, a copy of the report also must be deposited with that organization.

Field Investigations

The field research will include specific investigations at a number of archaeological or historical sites. These are as follows:

CA-MNT-587.—This site consists of two single-hole bedrock mortars spaced about 40 meters apart. As per the WESTEC recommendations, surface mapping and subsurface testing (augering) will be conducted at this site. The existing site record will be updated.

Site BRM-1 [CA-MNT-1253].—This site consists of a single bedrock mortar. As per the WESTEC recommendations, surface mapping and subsurface testing (augering) will be conducted at this site. A site record will also be prepared and a state trinomial will be applied for.

CA-MNT-811H.—This site is the remains of a 1930s wooden cabin constructed by Del Monte Properties. Archival research, interviews, and a field examination of the structure will be performed. The existing site record will be updated.

CA-MNT-812H.—This structure is a stone and adobe-mortar cabin which appears on a 1908 survey map. It has recently been restored. Archival research, interviews, and a field examination of the structure will be performed. The existing site record will be updated.

CA-MNT-813H.—This is the remains of a mortarless stone cabin which appears on a 1908 survey map. Archival research, interviews, and a field examination, including augering, will be performed. The existing site record will be updated.

CA-MNT-814H.—No further work was recommended at this site, once the location of a wooden cabin. This site will be reexamined, and if the current site record is not adequate it will be updated.

H-1 [CA-MNT-1246H].—This site is the remains of a 1930s wooden cabin constructed by Del Monte Properties. Archival research, interviews, and a field examination, including subsurface augering, will be performed. A site record will be prepared and a state trinomial will be applied for.

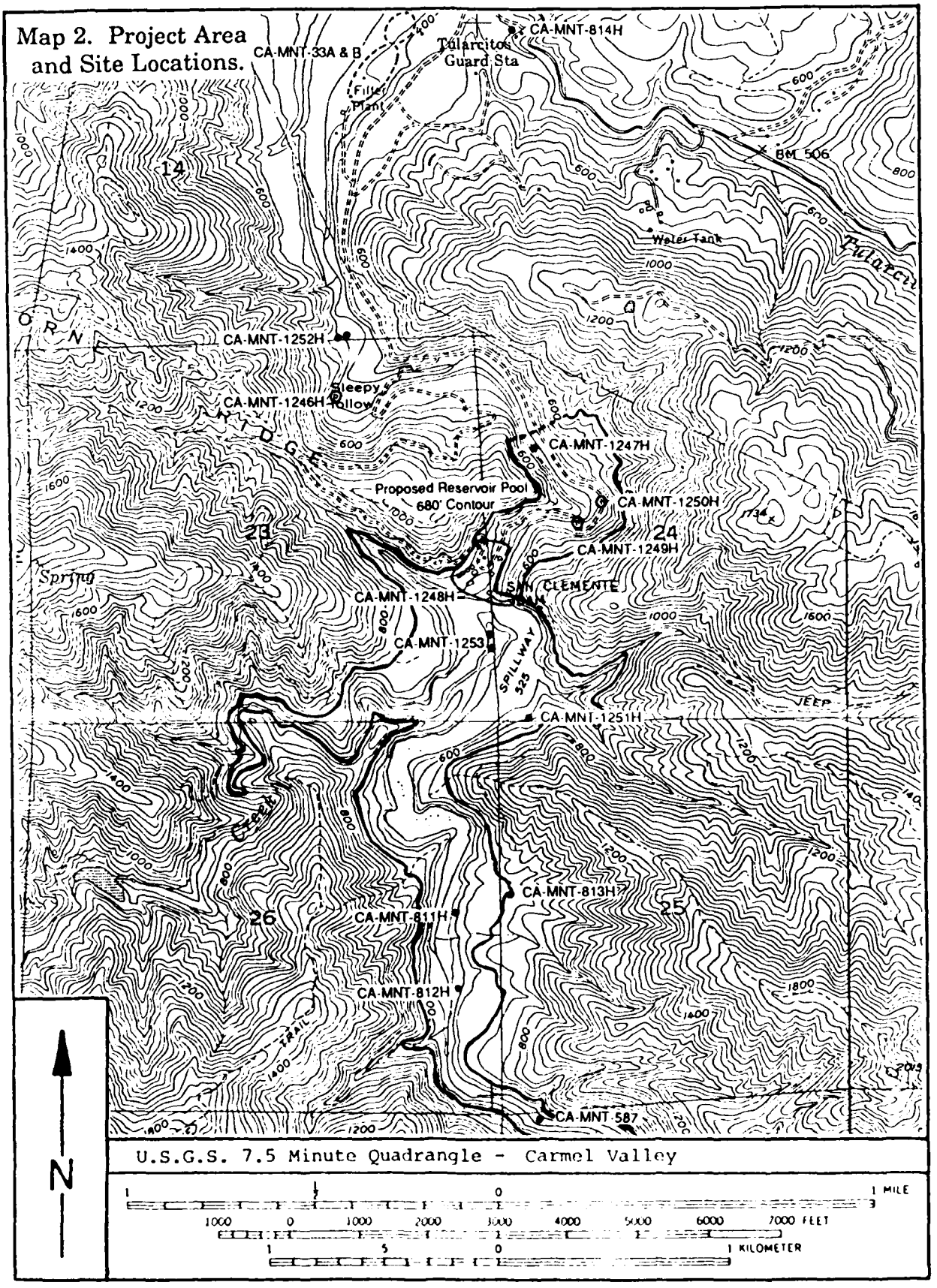
H-2 [CA-MNT-1247H].—This site is the deteriorated remains of a small hunting lodge. It probably dates to the 1930s. Archival research, interviews, and a field examination of the structure will be performed. A site record will be prepared and a state trinomial applied for.

H-3 [CA-MNT-1248H].—This site is the current San Clemente Dam and the adjacent San Clemente Guest Ranch, most of which now has been bulldozed. The dam dates to 1919-1921. Archival research, interviews, and a field examination of the site will be performed. A site record will be prepared and a state trinomial applied for.

H-4 [CA-MNT-1249H].—This site is the remains of the original Carmel Dam, now submerged. The structure, built by Chinese laborers during 1881-1883, now makes up the foundation of a roadway bridge. Archival research, interviews, and a field examination, including limited augering, will be performed. A site record will be prepared and a state trinomial applied for.

H-5 [CA-MNT-1250H].—This is the approximate site of an unlocated cabin dating to about the 1920s. No further work was recommended at this site. The potential location of this site will be reexamined, and if any remains are located a site record will be prepared and a state trinomial applied for.

H-6 [CA-MNT-1251H].—This is the remains of a homestead. It dates to at least 1908. Archival research, interviews, and a field examination, including limited augering, will be performed. A site record will be prepared and a state trinomial applied for.


Map 2. Project Area and Site Locations.
CA-MNT-33A & B
Tularcitos Guard Sta
CA-MNT-814H
Filter Plant
BM 506
Water Tank
Tularcitos
CA-MNT-1252H
Sleepy Hollow
CA-MNT-1246H
RIDGE
CA-MNT-1247H
Proposed Reservoir Pool
680' Contour
CA-MNT-1250H
CA-MNT-1249H
CA-MNT-1248H
SAN CLEMENTE
CA-MNT-1253
SPILLWAY
525
JEEP
CA-MNT-1251H
CA-MNT-813H
CA-MNT-811H
CA-MNT-812H
TRAIL
CA-MNT-587
14
28
24
25
26
Spring
Creek
U.S.G.S. 7.5 Minute Quadrangle - Carmel Valley
1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 5 0 1 KILOMETER
N

H-7 [CA-MNT-1252H].—This is the approximate site of an unlocated cabin dating to about the 1920s. No further work was recommended at this site. The potential location of this site will be reexamined, and if any remains are located a site record will be prepared and a state trinomial applied for.

Analysis and Report Preparation

The results of the above field and archival investigations will be summarized in a final report. This will contain details on the methods used, and the results obtained, during the project. It also will provide an evaluation of the National Register eligibility of each site based on current standards.

METHODOLOGY

Archival Investigation

The research method employed for the current investigation was to conduct intensive archival research based on consultation of primary source material; that is, examination and interpretation of documentation created contemporaneously with the event under study, usually with first hand contact with or general factual knowledge of the event being recorded (U.S. Department of Transportation 1977:VII:29). The current investigation is the third in a series of increasingly specific historical investigations.

Patricia Parker Hickman (Edwards et al. 1974) first provided a broadly-based social and economic history of the area, identifying major historical changes, trends and interactions, and those properties, groups and individuals who contributed to the historical development of the study area. Terri Jacques (WESTEC Services Inc., 1984) identified specific properties to be impacted by the proposed dam construction project, and carried out preliminary archival research based predominantly on examination of secondary source material; that is, documentation created at some distance in time and place from the event being recorded (U.S. Department of Transportation 1977:VII:29). In addition to previously published narrative histories and research reports, the preliminary research phase relied heavily on interviews with current and former employees of the Pebble Beach Company, whose holdings included much of the project area until recent years.

Preliminary research identified maps and other collections of the Pebble Beach Company with potential value in the intensive archival research phase to follow. The current intensive archival research follows and expands the research recommendations made by WESTEC Services, Inc. to specifically address criteria for eligibility to the National Register of Historic Places. Some changes in research direction were made where the preliminary recommendations seemed inadequate or inappropriate. For example, a search of land title records was recommended as optional, whereas the elucidation of land ownership and tenure actually could be expected to provide information of exceptional value in interpreting project area land use history. No recommendation was made for examination of the extensive (approximately 840 linear feet) collection of Pacific Improvement Company archives housed at Stanford University, or of dam engineering literature relevant to the placement of the Carmel River dams in the context of the history of technology. In addition, the recommendation to conduct further interviews with Pebble Beach Company employees whose associations with the project area historical sites post-dated construction by twenty to seventy years was interpreted as an unproductive line of research in a search for contemporaneous records.

With a goal of gathering information relevant to determination of National Register eligibility criteria, primary source material was sought that would provide information about the people who built and used sites and structures in the project area, and their contributions to broad patterns of history; about the methods of construction and association with engineers or engineering technology of significance in the two dams present in the project area; and the extent to which the extant project area historic sites possess integrity of original location, design, setting, materials, workmanship, feeling and association (see 36 CFR 60.6). The following is a list of archival repositories visited in the course of investigations, and the type of material relevant to the project sought there:

> University of California, Berkeley, Water Resources Center Archives: Documents, journals, reports, photographs regarding the construction of masonry and concrete arch dams, and reports of the California Water Resources Department referring to San Clemente Dam.
>
> University of California, Berkeley, Engineering Library: Contributions to engineering literature by engineers associated with the Carmel River dams, and contemporary reports on masonry and concrete arch dams.

University of California, Santa Cruz, McHenry Library Map Department: Topographical maps and aerial photographs of the project area.

Stanford University Greene Library Special Collections: Pacific Improvement Company Collection—books, reports, maps, plans, deeds, agreements, photographs, correspondence, ephemera.

Monterey County Office of the Recorder, Salinas: Deeds, patents, homesteads, preemption claims, water rights, probate.

Monterey County Library Research Center, Salinas: Photograph collections, local history ephemera file, census microfilms (some of the microfilms were on loan to other institutions and not available at the time research was conducted).

John Steinbeck Library, Salinas: Local history files.

Harrison Memorial Library, Carmel: Nixon local history file, *Carmel Pine Cone* microfilms.

Pebble Beach Company, Pebble Beach: Maps, surveys, interviews.

We wish to thank the archivists and librarians of these institutions for their assistance in locating and evaluating material relevant to the project. In particular, we would like to acknowledge the outstanding support, research contributions, and great patience of Victor Maillett of the Pebble Beach Company, who graciously provided descriptions and interpretation of the Company's historical holdings; and the staff of the Stanford University Greene Library Special Collections, who provided access and guidance to the invaluable collection of Pacific Improvement Company archives donated to the University by W. W. Crocker, Company President, in 1941.

Field Investigation

Primary crew members included R. Paul Hampson (principal investigator), and Charlotte Simpson-Smith. Larry Bourdeau also participated as a crew member during part of the investigations. On the first day of field work the crew included Micki Ryan (historical researcher) to enhance her understanding of the project area and specific sites.

All previously recorded sites within the project area were visited. The locations of those sites which were identified and recorded by WESTEC on the basis of archival information but which were not located at that time (1983) were also visited. This resulted in the location of one previously unlocated site (CA-MNT-1252H—the "Feliz cabins"). Site records for all sites are being updated as a result

of these visits. The updates include scaled site maps, measured drawings of features, photographs, and the inclusion of pertinent archival information. Mapping was accomplished with the use of a transit, stadia rod and/or tape line, or with a Brunton pocket transit and tape line; dependant largely upon logistical circumstances.

Previously recorded site locations were carefully checked to promote accuracy. This resulted in new site locational data for three sites (CA-MNT-811H, -812H, and -813H), and slight adjustments to some other Universal Transverse Mercator Grid (UTMG) coordinates.

Limited hand auger borings were made to ascertain the existence, depth, and nature of subsurface deposits. At times subsurface conditions (i.e., dense gravels, cobbles) prevented auger boring; hand excavation with a trowel or shovel was used in those instances for subsurface exploration. A 1/8 inch mesh screen was used to isolate cultural materials from the excavated soil.

HISTORICAL BACKGROUND OF THE PROJECT AREA

In discussing the developmental, social and economic history of the study area, Hickman stated:

> The history of the Upper Carmel Valley has been characterized by cultural adaptations of two rather distinctive landscapes, each of which offered different options to the people who settled within them. These adaptations have resulted in the development of at least three communities, in the northern, the southern, and the western sections of the project area. These communities differ in their socio-economic characters, and in their orientations to areas outside the Upper Valley itself [Edwards et al. 1974:39].

Hickman went on to identify the northern section community as predominantly agricultural through time, with a stratified social system of landowners and agricultural laborers; the southern section community as small and egalitarian, with land use closely tied to broader economic cycles of depression and inflation; and the western section, site of the current investigations, as oriented to developments in the Monterey-Carmel region, with land use directed by the interests of the Del Monte Properties resort landowner, its precursors, and subsidiary companies.

Hickman described land use during the Mission Period, 1770 to 1834, as concentrated close to the floodplain of the Carmel River north, east and west of the current project area. Mission San Carlos Borromeo herds were pastured and Indian neophytes housed at Ranchos Los Laureles and Tularcitos, while the rugged canyons of the project area were thought to be places of refuge for fugitives from the mission.

Following secularization of California's missions in 1834, the mission ranchos were opened for settlement by favored citizens of Mexico. The activities of the ensuing cattle hide and tallow based economy had little effect on the relatively remote reaches of the project area, although wild game from the Carmel River watershed undoubtedly supplemented a few tables, and herbal remedies surely were gathered from its forest and meadows. The presence of scattered archaeological sites found in recent years to contain a mixture of historic and aboriginal materials (see restricted appendices, Edwards et al. 1974; WESTEC 1984) confirms that the surviving native population continued to maintain seasonal camps in the study area during the early 19th century. With American annexation, however, a more intensive system of land development and speculative enterprise was ushered in.

One of the most far-reaching impacts of Americanization was the enactment of the Land Act of 1851, which required that the burden of proof of title be borne by all owners of land granted by the Mexican government—an Act that was in direct defiance of provisions of the Treaty of Guadalupe Hidalgo between the United States and Mexico. The Act essentially presumed all California lands public domain unless proven otherwise before a Board of United States Land Commissioners. The effect of the Land Act was to break up vast rancho holdings as land-poor Mexican owners struggled to pay costs of litigation with acreage, while squatters waited out the land court hearings and official government surveys for an opportunity to file preemption claims on disputed lands (Robinson 1948:100-103, 167).

The status of land in California brought many investors and opportunists to the Monterey Peninsula and Salinas Valley, where the port facilities and rich agricultural and pasture lands had attracted attention since the days of the Gold Rush. The rancho boundaries close to the project area, Los Tularcitos and Los Laureles, were officially surveyed in 1860 and 1866 (Pebble Beach Co. n.d.a). Both ranchos were subdivided and sold by the original Mexican grantees to Americans

in the 1860s, with Los Laureles purchased by San Francisco investor N. W. Spaulding (Edwards et al. 1974:51). In 1873 section corners in public lands of Section 24, Township 17 South, Range 2 East, immediately east of the project area, were surveyed by Hall, according to the notes of later surveyor William T. Moore, but no cultural features such as cabins or roads were noted at that time (Pebble Beach Co. n.d.a).

By 1874 Spaulding and his partner E. Tripp were involved in the construction of a ditch or flume originating from the "Carmelo" River just north of the project area in Tularcitos Rancho, which carried irrigation water through Los Laureles Rancho and re-entered the Carmelo River. Year-round access to irrigation water would have greatly improved agricultural production on Los Laureles, and consequently would have escalated the value of the land. Andrew Jackson Ougheltree, owner of the affected portion of Tularcitos Rancho, granted a right of way for the flume to Spaulding and Tripp on December 19, 1874. The document specified that the grantees provide bridges at crossings and provide Ougheltree's stock with watering troughs at intervals (Pacific Improvement Company JL 17, 19:3). On December 23, 1876, Ougheltree granted an additional right-of-way to expand the existing "Laureles Ditch" and flume across his property; this agreement was witnessed by Spaulding's Laureles Ranch manager, Kinzea Clinkingbeard, also referred to by other historians as Klinkenbeard (Pacific Improvement Company JL 17, 19:3).

By 1878 the possibilities for sound investment in the Monterey Peninsula had attracted the attention of history's "Big Four", Collis Patten Huntington, Leland Stanford, Mark Hopkins, and Charles Crocker. On November 4, 1878 they formed the Pacific Improvement Company, a large holding company with interests throughout the western United States and Central America in real estate development, coal mining, oil fields, railroad, streetcar and steamship transportation systems, and resort properties (McClure 1966). In 1880 the Pacific Improvement Company constructed the Hotel Del Monte at Monterey, compared in the promotional literature of the day with the grand summer hotels of the eastern seaboard. With direct ties and predictably favorable fares on the Southern Pacific rail lines and passenger steamers, the Company sought to attract a world-wide clientele, promoting the winter sunshine to Easterners and Europeans while boasting of cool summers to Californians. Water for the hotel operations (each of 89 suites featured its own bath, in addition to "modern conveniences" for the re-

maining 39 single rooms, as well as kitchens, fire extinguishers, tropical landscaping, and fountains, was supplied by an artesian well on the premises (Elliott 1881:125, 126).

Seeking to provide company-owned supplies of meat and dairy products, in addition to expanding its resort facilities and securing valuable outlying lands, the Pacific Improvement Company purchased all of Los Laureles Ranch on August 16, 1882, from Frederick Getchell and Frank Henckley. The deed specifically included the eight mile long Laureles Ditch from Tularcitos Ranch, the Carmel River and all water rights and rights-of-way (Pacific Improvement Company JL 17, 19:2). Plans to secure a continuous supply of water for the needs of the Company on the Monterey Peninsula became apparent during August and September of the same year, when Company director Collis P. Huntington began purchasing rights-of-way and water rights from a continuous line of property owners along the Carmel River, from Township 17 South Range 2 East of the public lands to the mouth of the Valley. Among these were John and Ann Murphy, who conveyed a right-of-way and the right to use and appropriate water from the Carmel River to Huntington on March 20, 1883 (Pacific Improvement Company JL 17, 19:3). It is presumed that these are the Murphys for whom Murphy's Flat in the project area is named, and who later received patent to lands in Section 26 along the Carmel River; however, surveyors from the General Land Office who completed section line remapping in 1883 made no note of their presence, while detailing the locations of several other settlers in nearby sections outside the project area (U.S. Surveyor General 1883, 1884).

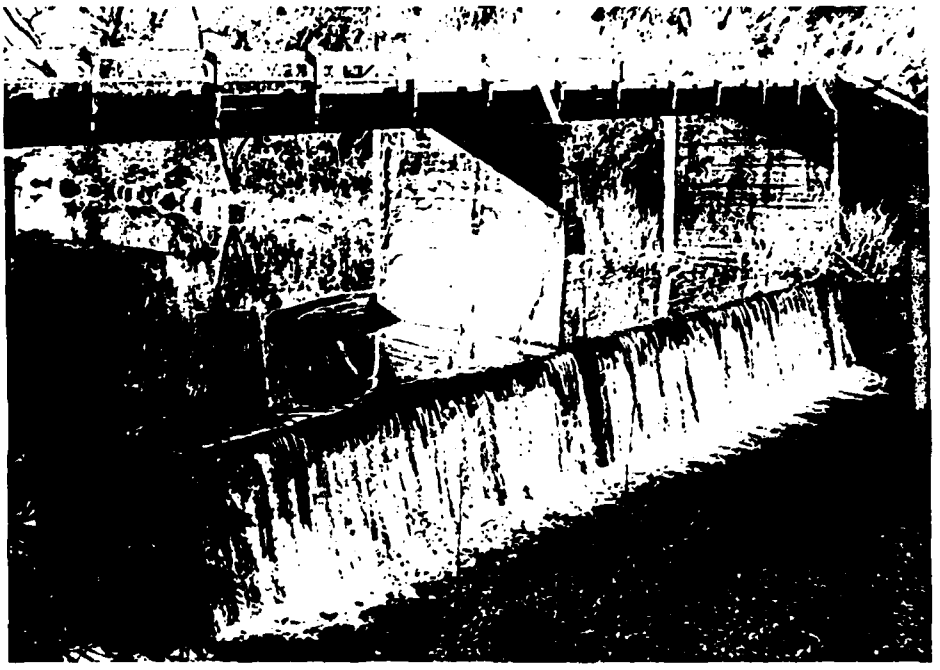
On April 7, 1883, shortly after securing a right-of-way from Rufus Smith of Tularcitos Ranch, who claimed the water rights recorded by A. J. Ougheltree in 1876, the Pacific Improvement Company filed a declaration of intent to divert and appropriate waters of the Carmel River by the erection of a dam and use of iron pipe 18 inches in diameter, the dam to be erected on the line dividing the northwest and southwest quarters of Section 24, Township 17 South, Range 2 East (Pacific Improvement Company JL 17, 19:3). Construction of the dam and associated work was carried out in 1883 and 1884. Company accounting records list construction costs of $38,083.25 for purchase of rights-of-way, grading, and engineering; pipe and pipelaying $362,019.13; a temporary dam, the Carmel Dam (CA-MNT-1249H), and fish ladders $22,993.55; and construction of the first reservoir $65,079.88 (Pacific Improvement Company JL 17, 19:10). On November 18, 1890,

the Pacific Improvement Company purchased all right-of-ways conveyed to C. P. Huntington for the Carmel Valley pipeline, and in 1891 continued work on improvements to the dam and pipeline. The accounting records of 1891 to 1905 for Carmel Dam expenses provide a detailed view of projects, workmen and equipment at the dam (Pacific Improvement Company JL 17, 19:10).

In April, 1891, the accounting records noted a payment of $822.50 to Lott D. Norton for lands in the western quarters of Section 24, Township 17 South, Range 2 East, which now include three historic sites in the study area. Mr. Norton subsequently appeared regularly in the Company accounting records as the supervising engineer for improvements to Carmel Dam, its reservoir and pipeline from September 1891 to November 1892, when he was boarded at Company expense at the Dam, and again in 1900 for drafting services (Pacific Improvement Company JL 17, 19:10). Mr. Norton's role with the Pacific Improvement Company was further clarified in the United States General Land Office records, when he filed for and received patent on October 18, 1892, to the same acreage sold the previous year (Monterey County Patents 6:68). Clearly Norton acted as an unofficial agent for the Company, filing claim to public lands as a qualified individual, with payment from the Company under an unwritten agreement to reconvey the lands, thus circumventing public land laws. This was the first of several such transactions by the Pacific Improvement Company in the project area (and common practice of the day by all the major western land development companies), which eventually led to acquisition of all lands of the San Clemente Dam, reservoir, and Company recreation areas (CA-MNT-1248H).

Other Company expenses for the Carmel Dam of interest to the current investigation are payments during June, November, and December 1891, to three Chinese contractors for ditching. Yaw Hee, Gow Hee and Yow Kee were paid a total of $1,674.02 for ditching on the 23-mile pipeline, which was listed as a project expense separate from pipe laying on a new main line (Pacific Improvement Company JL 17, 19:10). Several local historians have mentioned the role of the Chinese in construction of the Company's dam and pipeline (Fink 1972:198; DeVoe 1979:35; Lydon 1985:174), most frequently with mention of 700 Chinese employed by the Company at this task. Unfortunately, the accounting does not indicate how many laborers were provided by the three Chinese contractors or where they were housed, nor do the Company archives provide specifics about contracted labor or other personnel during the initital dam construction of 1883-1884.

Figure 1. CA-MNT-1249H, Carmel Dam.



The entry does document the Company practice of employing contracted Chinese labor, however, providing support for traditional assumptions that the original Carmel Dam and pipeline were constructed by the Chinese. Lydon (1985:175) notes that "trainloads of Chinese laborers" were brought to the Monterey Peninsula when needed by the Company for another massive reservoir construction project in 1888, and were removed to Southern Pacific Railroad projects when the job was completed.

During the 1891-1892 construction project, which appears to have been related to installing floodgates and enlarging the reservoir as well as improving the pipeline, a construction camp was established at the dam site in addition to housing moved in from another site for the supervising engineer, Lott D. Norton. Norton also engaged a draftsman in August, 1892, and a second engineer, W. D. Gelette, in September of 1892. No plans or drawings of the work at the dam were located in the Company archives. Norton and Gelette had completed their work at the dam by October, 1892, but work on pipeline alterations continued until November 1893. A cursory note in the records indicated that a second reservoir was constructed between June 1884 and December 1896 for $154,653.82, but whether this refers to the Carmel Dam reservoir work above, or to another of the Company properties on the Monterey Peninsula is not clear (Pacific Improvement Company JL 17, 19:10).

Beginning in 1905 a number of land transactions took place that signaled a renewed Company interest in the Carmel River water supply and the project area. In February of that year, the Company's Carmel Dam accounts note a payment of $570 to Richard Lyman for land at Carmel Dam; $1,025 to J. P. Pryor in March for lands in Township 17 South, Range 2 East; $1,025 to Winham Brothers in April for purchase of Murphy land, and $4,006 to J. B. R. Cooper in November for the purchase of lands (Pacific Improvement Company JL 17, 19:10). Cross-checked with land title records, the pattern revealed a plan to secure all the land surrounding the site of the existing San Clemente Dam.

Richard M. Lyman filed a claim in the General Land Office for patent to 120 acres in the northwest and southwest quarters of Section 24 on July 18, 1905, including the site of the 1883 Carmel Dam, by relinquishing a claim to public lands in Utah (Monterey County Patents F:254). The J. P. Pryor lands were not located in local land title records, indicating that Pryor may perhaps have been an agent or that the transaction was incorrectly recorded or overlooked. The Murphy land

is presumed to be the land claimed by John M. and Ann Murphy, signing themselves as real estate owners on the Carmel River when granting water rights to C. P. Huntington in 1883. Ann Murphy filed for patent to 160 acres of public land in the easternmost lots of Section 26, including the present locations of historic structures and ruins, on November 27, 1890. A homestead claim was also recorded to John M. and Ann Murphy in 1884, but was well west of the project area in Township 16 South, Range 1 West (Monterey County Homesteads A:482). As no recorded transfer of title between Murphy or Winham and the Pacific Improvement Company could be located, the pattern of tenure for the Murphy parcel remains unclear. Related to the October transactions, the Company filed an addition to its claim of water rights to the Carmel River (originally filed in 1883) on October 2, claiming waters to the extent of 800 miner's inches measured under 4 inches pressure, and use of a 26 inch diameter iron pipe (Pacific Improvement Company JL 17, 19:4).

The John B. R. Cooper lands purchased by the Company on October 21, 1905, were in Sections 14 and 23, consisting of 156.76 acres along the Carmel River, and included the present site of two historic structure ruins. Cooper had purchased the lands the previous day, October 20, 1905, from Frederick P. and Nellie Feliz, whose name appears on later Company maps associated with a cabin (CA-MNT-1252H) in that area (Monterey County Deeds 86:359, 476). Feliz was extremely active in real estate trading in Monterey County from 1899 to at least 1906, but no record of his acquisition of those lands could be located (Monterey County Index to Deeds; Deeds: 59, 71, 75, 79, 86, 88, 89). The preemption books of public record were not available to project researchers during investigations at the Monterey County Office of the Recorder, rendering that line of research incomplete.

On September 25, 1906, the Company purchased a total of 723 acres from Andrew Jackson Ougheltree in Sections 11, 14, 15, 22 and 23, the significant portion of which included the present site of the "San Clemente Dude Ranch" (CA-MNT-1248H) in Section 23. Filed with the deed in Company records was a statement of exemplification from the General Land Office, requested by the Secretary of the Company on November 2, 1906, which reaffirmed the original Laureles Ditch right-of-way (Pacific Improvement Company JL 17, 19:2).

With ownership and water rights to the Carmel River secured, the Pacific Improvement Company formed the Monterey County Water Works on August 27,

1907, and conveyed all its upper Carmel River properties, including the Carmel Dam to the Monterey County Water Works (Pacific Improvement Company JL 17, 35:6). The Monterey County Water Works properties were surveyed in 1908 by William T. Moore, with note made of three of the historic sites currently under study: Murphy's Stone Cabin and Corral in Section 26 (CA-MNT-812H), an unidentified stone cabin now in ruins in Section 25 (CA-MNT-813H), and Murphy's Frame Cabin in Section 24 (CA-MNT-1251H), close to the section line between 24 and 25. Moore also made note of the locations of section corners marked by General Land Office and Company surveyors in 1883 and earlier, consisting of stone mounds with 3 inch diameter white oak stakes (Pebble Beach Co. 1908).

Records of income and disbursements of the Monterey County Water Works note that fees to users changed from a flat fee to metered rates in 1907, and that most years saw little if any profit for the Monterey County Water Works. One of the greatest continuous expenditures was for replacement of pipes and pumping equipment, as well as repairs to the Carmel Dam. At some point prior to 1916, the City of Monterey sued Monterey County Water Works for "unreasonable and unjust" rates, resulting in a decision by the regulatory California Railroad Commission in 1916 to set rates in favor of the Company (Pacific Improvement Company JL 17, 35:6, 25:13, 99:1).

The increasing woes of the Monterey County Water Works through the 1910s coincided with new developments in arch dam engineering technology. Regarded with great favor world-wide, arch dams had enjoyed increasing popularity in the United States and Italy since the middle 19th century, although the concept and implementation had been a part of dam technology since the year 1611. In 1912, however, L. R. Jorgensen of the American Society of Civil Engineers published the principle of the Constant Angle Arch Dam, involving new understanding of the complicated stresses of water load on arch radii and the elastic properties of concrete under load. Although inspired by thoughts of greater economy in concrete dam construction, the principle was to revolutionize dam construction world-wide (Hawley 1932:12). Shortly thereafter, a major engineering company based in San Francisco published appropriate applications for its constant angle arch dam, specifying its success in narrow canyons with walls and floor of bedrock (Baum n.d.).

In 1913 Monterey County Water Works announced its purchase of the Carmel water system (California Water and Telephone Company 1951), and in the

same year reported expenses of $42,861 on improvements to Carmel Dam with revenues of barely over $7,000 (Pacific Improvement Company JL 17, 99:1). In 1915, Monterey County Water Works manager C. S. Olmstead submitted an extensive report to the Pacific Improvement Company analyzing the current and future water system needs, expenses of maintaining the current dam, reservoirs, and pipeline, and the benefits of construction of a new constant angle concrete arch dam at the site marked on the accompanying map as "San Clemente Dam Site". In his report, Olmstead noted that water saving measures could be implemented to get by for up to ten years if population growth continued at the recent rate, but suggested that the Company should exert its rights to appropriate all available Carmel River water during the summer months before construction of a new dam actually became necessary. An alternative site, Syndicate #2 (at Syndicate Camp) was presented as well, although not recommended because of the additional land purchase costs. Cost tables for various heights of concrete dams were also included in the report (Pacific Improvement Company JL 17, 19:4).

Olmstead's detailed analysis was followed by an appeal to the California Railroad Commission to allow division of the Monterey County Water Works properties between the Pacific Improvement Company and Monterey County Water Works, with the Pacific Improvement Company obtaining control of Carmel Dam, the upper Carmel Valley properties, and the Pacific Grove reservoir, while Monterey County Water Works operated the Pacific Grove, Carmel and Monterey pumping and distribution systems. Ownership was divided 65% Monterey County Water Works and 35% Pacific Improvement Company. The Commission approved the change in the public utility on January 25, 1916, and approved the protested rate increase as well (Pacific Improvement Company JL 17, 35:6). The Company then retained engineer J. A. Wilcox to evaluate the proposed dam sites and prepare cost comparisons for the alternatives. Wilcox's report was made January 18, 1918, concluding that the most economical and technologically appropriate project would be a constant angle concrete arch dam at the San Clemente site as marked on Olmstead's 1915 map. Plans and photographs of such a dam near Juneau, Alaska, were used to illustrate the data (Pacific Improvement Company JL 17, 22:30). In the meantime, U.S. Geological Survey crews had surveyed the project area in 1917, but made no note of cultural features in the project area (USGS 1921).

On January 25, 1919, notice was filed of the formation of Del Monte Properties Company, a corporation to acquire properties on the Monterey Peninsula formerly owned by the Pacific Improvement Company. The value of the properties was conservatively appraised at $3,673,410, in addition to capital stock of the Monterey County Water Works at $650,000 and the Del Monte Pipeline at $300,000 (Pacific Improvement Company JL 17, 21:6). Samuel F. B. Morse, formerly the manager of Pacific Improvement Company properties on the Monterey Peninsula and now President of Del Monte Properties, announced in March the company's plans to develop fully all its properties on the Peninsula, envisioning it as "the playground of the state."

Charles S. Olmstead, Superintendent of the Monterey County Water Works, was named Manager of the Del Monte Properties real estate department and Del Monte Rancho (*Carmel Pine Cone*, March 6 and May 1, 1919). A map of all company real estate holdings on the Monterey Peninsula was prepared in 1919, including the project area, and revised in 1920 to include lands "reserved for reservoir site," the site of San Clemente Dam (Pebble Beach Company 1919a; 1919b; 1920a). In April, 1920, Del Monte Properties Director Herbert Fleishacker purchased Los Laureles Rancho and certain adjoining properties from the Company, specifically not including the water rights which were retained by the Company (Pacific Improvement Company JL 17, 21:8).

Under the management of Morse and Olmstead, the San Clemente Dam got off the drawing boards and into construction. Olmstead announced the beginning of construction in May 1920, predicting completion in seven months; by December 9th Olmstead had invited the officers and directors of the Company to view the progress before the new reservoir was to be filled in January 1921. The following week Olmstead announced plans to establish a fishing and hunting lodge at the new dam (*Carmel Pine Cone*, May 6 and December 9, 16, 1920).

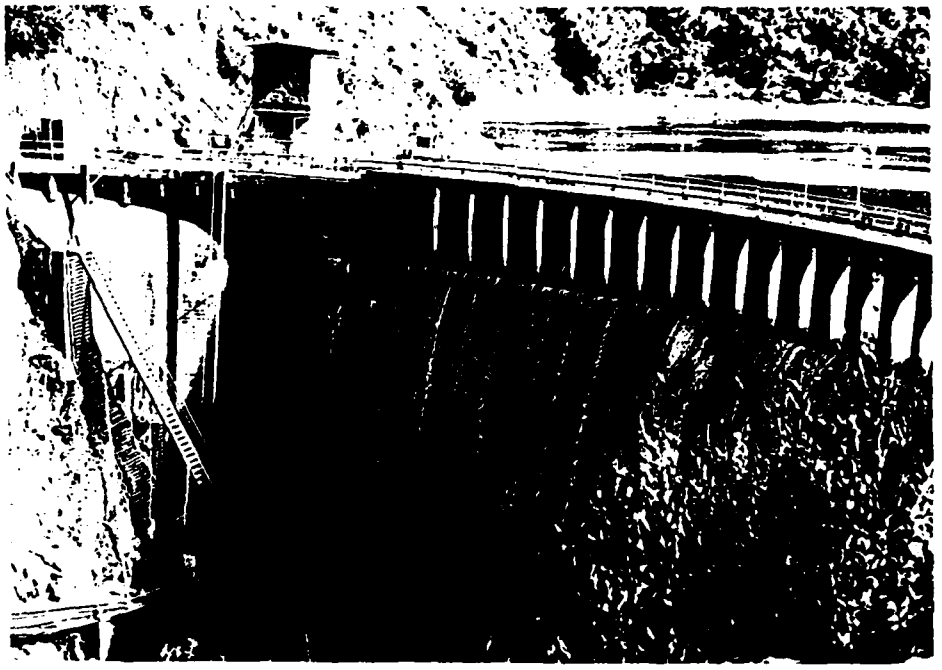
A series of profiles and sections of the newly constructed dam prepared by D. Howard in January 1921, documented some historically significant changes. Drawn to show a comparison between the original construction plans and that actually constructed, the changes appear to show that the curvature and the fillet, or thickness at the abutments, were increased, and the base was excavated more deeply into bedrock while the dam appeared somewhat thinner or with a longer vertical curve in the cantilever sections (Pebble Beach Company 1921b). The changes seem to reflect the newest idea in arch load formulas utilizing both

horizontal arch action and cantilever or vertical beam action. The newer formula, as published by F. A. Noetzli of the American Society of Civil Engineers, came into favor in 1920 and immediately dispossessed the historically used cylinder formula (Hawley 1932:13)15).

Company accounting records for 1920-1921 show that $140,000 was expended on dam construction to January 1921, and that construction continued through June, 1921, with expenditures of $7,000-8,000 per month in dam payrolls. The dam construction was substantially funded by Company director Herbert Fleishacker and with additional internal funding (Pacific Improvement Company JL 17, 21:6). Plans for a fish ladder were completed by William T. Moore in November 1921 (Pebble Beach Company 1921a), and final disbursements of $25,000 for completion of the dam and fishway were made in March 1922 (Pacific Improvement Company JL 17, 25:13). The completed 290 foot dam crest was mapped at 537 feet above sea level, rising 90 feet above bedrock with a spillway 75 feet above the normal river level (Pacific Improvement Company JL 17, 21:14). The completed fishway consisted of a series of 28 five foot deep concrete basins, including three rest pools, climbing the western canyon wall (Pebble Beach Company 1921a). Upon completion, the Company then retained J. A. Wilcox for a study of the feasibility of a power plant at the base of the dam. Wilcox recommended either increasing the head of the flow with gates, or operating the plant only a few hours each day, as the reservoir was of insufficient capacity for hydro-electric power purposes (Pacific Improvement Company JL 17, 21:14).

The Company mapped its properties in the Upper Carmel Valley in 1928, noting only the two historic stone cabins as features (CA-MNT-812H and -813H) (Pebble Beach Company 1928b). However, many of the features which are now extant or have visible traces appear on a detailed plot map of the buildings at San Clemente Dam prepared in 1930; this complex of structures have often been referred to as the hunting lodge or dude ranch. Building plans and elevations which accompany the plot provide details of a 16 x 20 foot cottage with rear enclosed porch, a 30 x 30 foot cottage with fireplace and full front porch, a larger cottage with horizontal v-groove siding and consisting of at least four rooms and a stone fireplace, a chicken house and outbuildings (Pebble Beach Company n.d.b). Plans for the "Dude Ranch Guest House" were prepared at the same time, showing a long building of board and bat siding on a post and sill foundation, consisting of six units and three shared baths (Pebble Beach Company 1930b).

Figure 2. CA-MNT-1248H, San Clemente Dam.



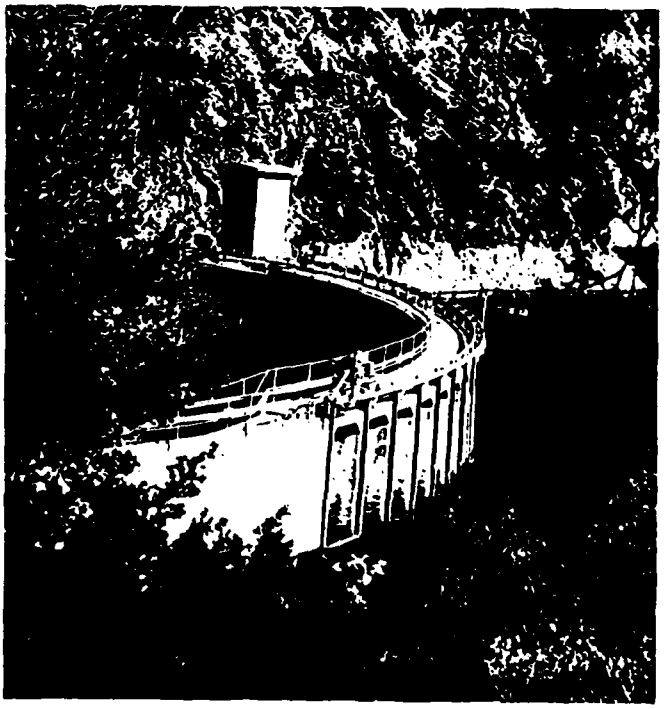
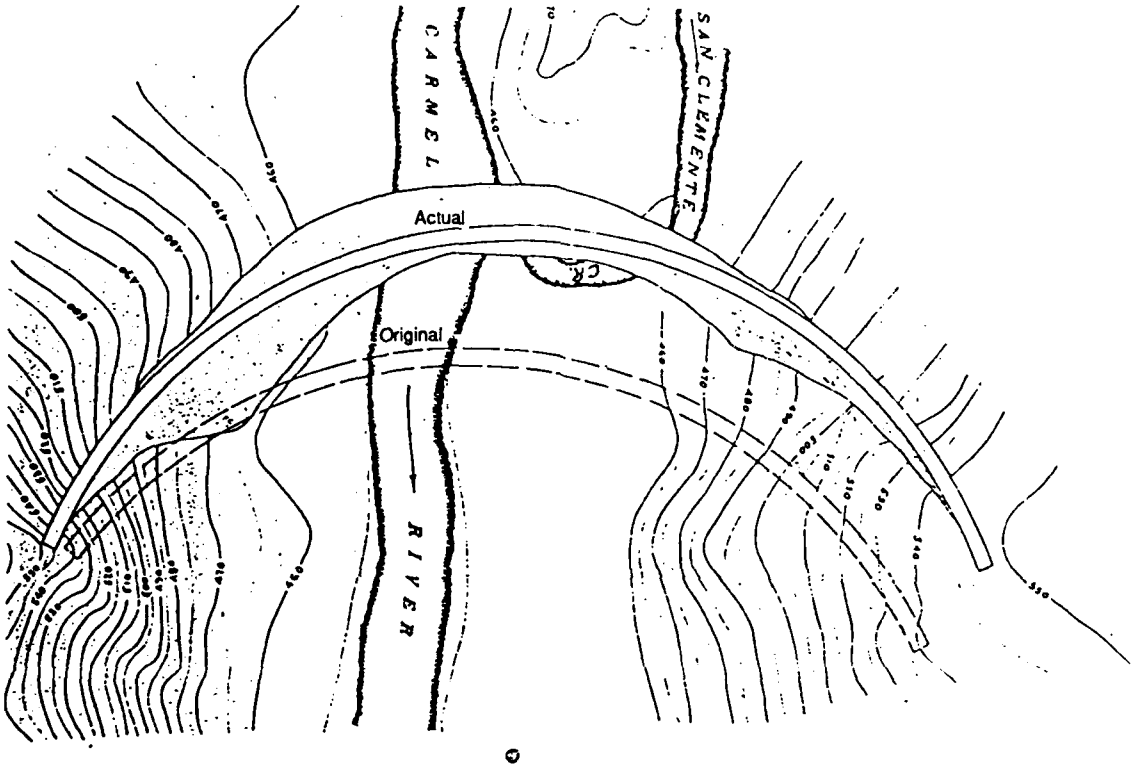


Figure 3. Topographical Map of the San Clemente Dam Site.



Topographical Map of the San Clemente Dam Site

Reduced from

DAM SHEETS

OF THE

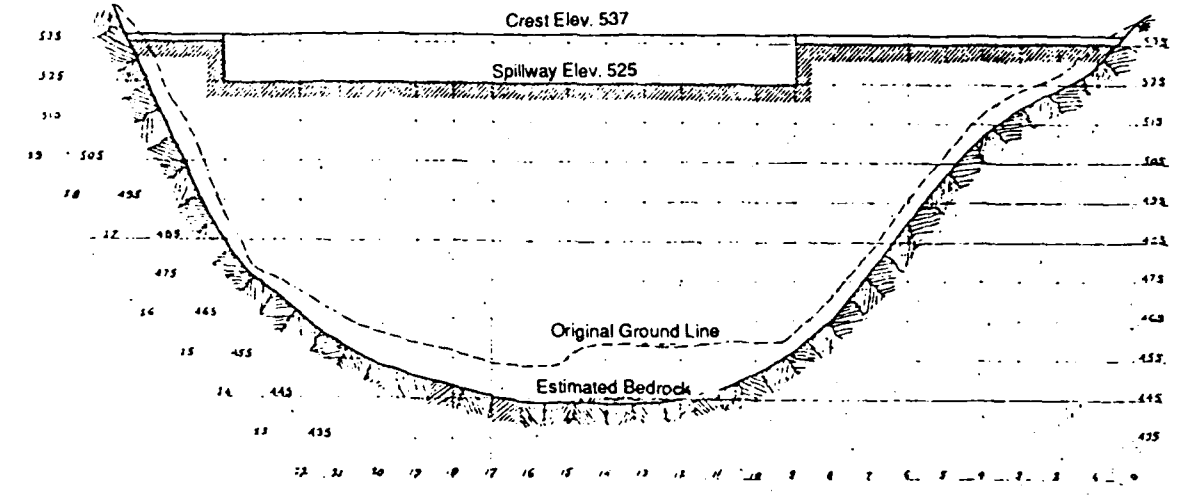
San Clemente Dam

Showing comparison between

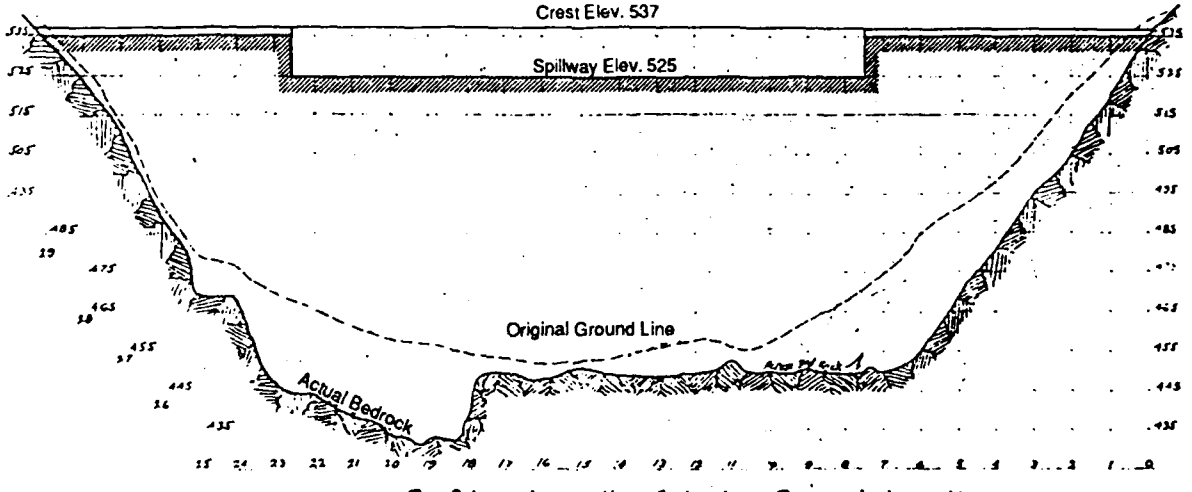
ORIGINALLY ESTIMATED AND ACTUALLY CONSTRUCTED

CARMEL RIVER, MONTEREY CO. CALIF

Figure 4. Profiles for the San Clemente Dam Site.



Profile along the Originally Proposed Location



Profile along the Actual or Present Location

Reduced from

DATA SHEETS

OF THE

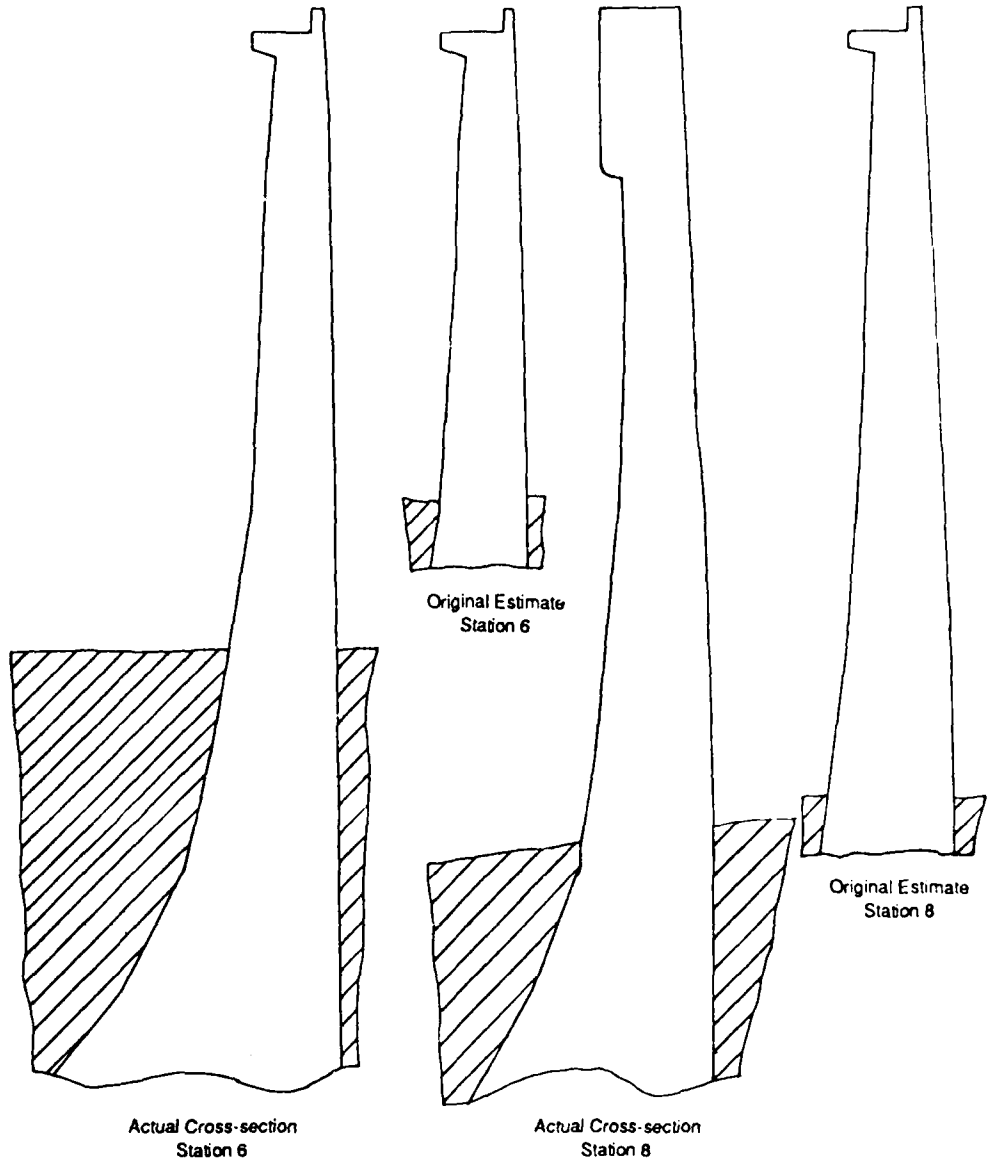
San Clemente Dam

Showing comparison between

ORIGINALLY ESTIMATED AND ACTUALLY CONSTRUCTED

CARMEL RIVER, MONTEREY CO. CALIF.

Figure 5. Sample Cross-sections for the San Clemente Dam.



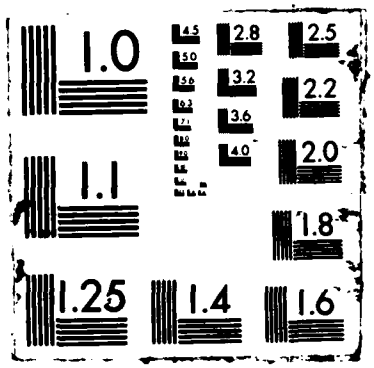
Although no information on the original construction date of a cabin at Sleepy Hollow was located, plans and elevations for two lavatory additions with showers were prepared for the Sleepy Hollow cabin in 1937. The drawings depict a vertical board and bat sided one-story structure, 24 x 40 feet overall including the new additions at the rear, with a central room with stone fireplace, and dressing rooms at either end designated for men and women (Pebble Beach Company 1937a).

In 1935, the Monterey County Water Works, including the San Clemente Dam, was purchased by the California Water and Telephone Company. In 1944 the Los Padres Dam was completed to provide additional storage for the Monterey Peninsula's water needs (Harrison Memorial Library, Nixon file 13-A, 65). The following winter many Carmel Valley residents expressed fears that the Los Padres dam would fail under the unexpectedly heavy rainfall, causing the San Clemente Dam, downstream, to fail as well. The State Inspector of Dams, Wayne Perkins, made several trips to Los Padres Dam in order to evaluate the situation, while California Water and Telephone Company manager C. M. Goldworthy assured frantic callers that all was well (*Carmel Pine Cone*, February 3, 1975). California Water and Telephone replaced all of the remaining original 18 inch iron pipe in the Carmel Valley pipeline with 30 inch pipe in 1947 (Harrison Memorial Library Nixon Files: California Water and Telephone Company, n.d.). In 1956-1957, following severe flooding in 1955, the State Water Resources Board and the County of Monterey made separate studies and proposals for a new dam to meet flood control, domestic, and irrigation needs; the Klondike, Syndicate and Feliz sites on the Carmel River were investigated (Harding and Bunte 1957:229).

Additional flooding of the Carmel River occurred in 1969 (Harrison Memorial Library Nixon Files: Carmel River). In 1971 the U. S. Army Corps of Engineers held the first public hearing for input on flood control and dam plans, housing the public meeting at Tularcitos School (HML Nixon Files: Carmel River). By 1975, Carmel Valley residents were fairly evenly divided in their opinions about the need for a new dam, with 44% opposing and 40% in favor of construction. Proponents cited the benefits of flood control, year-round water release, recreation and hydropower offered by construction, while opponents cited the danger of earthquake damage, loss of salmon and steelhead fishing, and stimulation of growth and development. They pointed out that the existing dams trapped sand and contributed to downstream erosion, noting that the San Clemente reservoir capacity had been reduced by one-third since its construction in 1920 due to silt buildup (Koploy 1980:51-53). The Corps released its pr[illegible]

AD-A185 031 ENVIRONMENTAL IMPACT STATEMENT FOR THE NEW SAN CLEMENTE PROJECT MONTEREY..(U) CORPS OF ENGINEERS SAN FRANCISCO CA SAN FRANCISCO DISTRICT SEP 87 3/3

UNCLASSIFIED F/G 13/2 NL


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
6.3

port on the dam study in 1977, recommending that the significance of thirteen historical/archaeological sites scheduled for inundation be investigated following authorization of construction plans (U.S. Army Corps of Engineers 1977:91). In 1978, Del Monte Properties announced a name change to Pebble Beach Company, and began disposing of certain properties acquired from the original Pacific Improvement Company, including portions of the project area lands (Harrison Memorial Library Nixon Files: Del Monte Properties). Recent transactions of the Del Monte Properties and Pebble Beach Company post-dating the National Register of Historic Places criteria for temporal significance, i.e., 1937, were considered beyond the scope of this investigation.

FIELD INVESTIGATIONS

Field investigations were conducted during the period of April 1 through April 15, 1987. Each site was relocated and examined to determine its current condition. State trinomials for the new sites noted in the WESTEC report (1984) have been issued and are used throughout this report; this information and copies of the site records prepared by WESTEC were obtained through the records search at the Regional Information Center, Sonoma State University, Rohnert Park. The site records are being updated to reflect current conditions and include pertinent archival information developed during this investigation. In addition, measured drawings, revised site maps, and photographs are being added as appropriate. The sites are discussed individually below:

CA-MNT-33A and B.—As noted in the research design (Breschini 1987:1), this large prehistoric village site has been determined by the Monterey Peninsula Water Management District to be outside of the current project impact area and is not included in the current investigation (cf. Sheeders 1987). The site, including two loci and covering a total of at least 16,000 square meters, is located in the vicinity of the existing filtration plant. It is believed to have been the location of the mission rancheria of *Sepponet*, described in the Mission San Carlos marriage books as "paraje del Sepponet cercana al Socorronda e San Miguel." The deposit at Locus B is at least 90-100 cm in depth, suggesting occupation prior to establishment of the rancheria. Earlier occupation, for a considerable period of time, is supported by a radiocarbon date of 2285 ± 100 years before present; this date was obtained from a

Haliotis sp. shell sample recovered from a depth of 132 cm in Locus A during an amateur excavation in 1972 (Breschini, Haversat, and Erlandson 1986:15). The total extent of the site may be masked by alluviation. Although the site was not examined as a part of this project, information in the existing site record suggests that it is likely to prove eligible for nomination to the National Register. Project designers should be aware that changes in the general vicinity of the filtration plant could affect this site adversely.

CA-MNT-587.—This site was originally recorded as two separate earthbound rocks containing a single mortar hole each and located approximately 40 m apart. Although considerable time was spent closely examining the site area, only one of the two rocks was relocated. Three trowel excavations to a depth of approximately 30 cm were made in the vicinity of the mortar rock (augering was not possible in the cobble filled soil) to augment the surface examination for cultural materials. No soil color changes or other cultural indicators were discovered. The investigation included a close examination of the surface of the adjacent, higher, terrace for indications of occupation, the results there were also negative. A supplementary site record is being prepared to include this information, and photographs/dimensions of the relocated mortar.

CA-MNT-811H.—The original site record describes this site as a three room cabin, with an associated shed and "water shed." The WESTEC visit (in 1983) further defined the site

> ...consists of the remains of a 1930s wooden cabin constructed by Del Monte Properties Company in conjunction with their San Clemente Lake and Guest Ranch. Still standing during recordation in 1974, the wood-frame, three-room cabin has since collapsed. ... Construction details of the cabin, such as tongue-and-groove flooring, single-wall construction and asphalt tile roofing, is identical to other cabins constructed by Del Monte Properties Company in these years [WESTEC 1984:12-13].

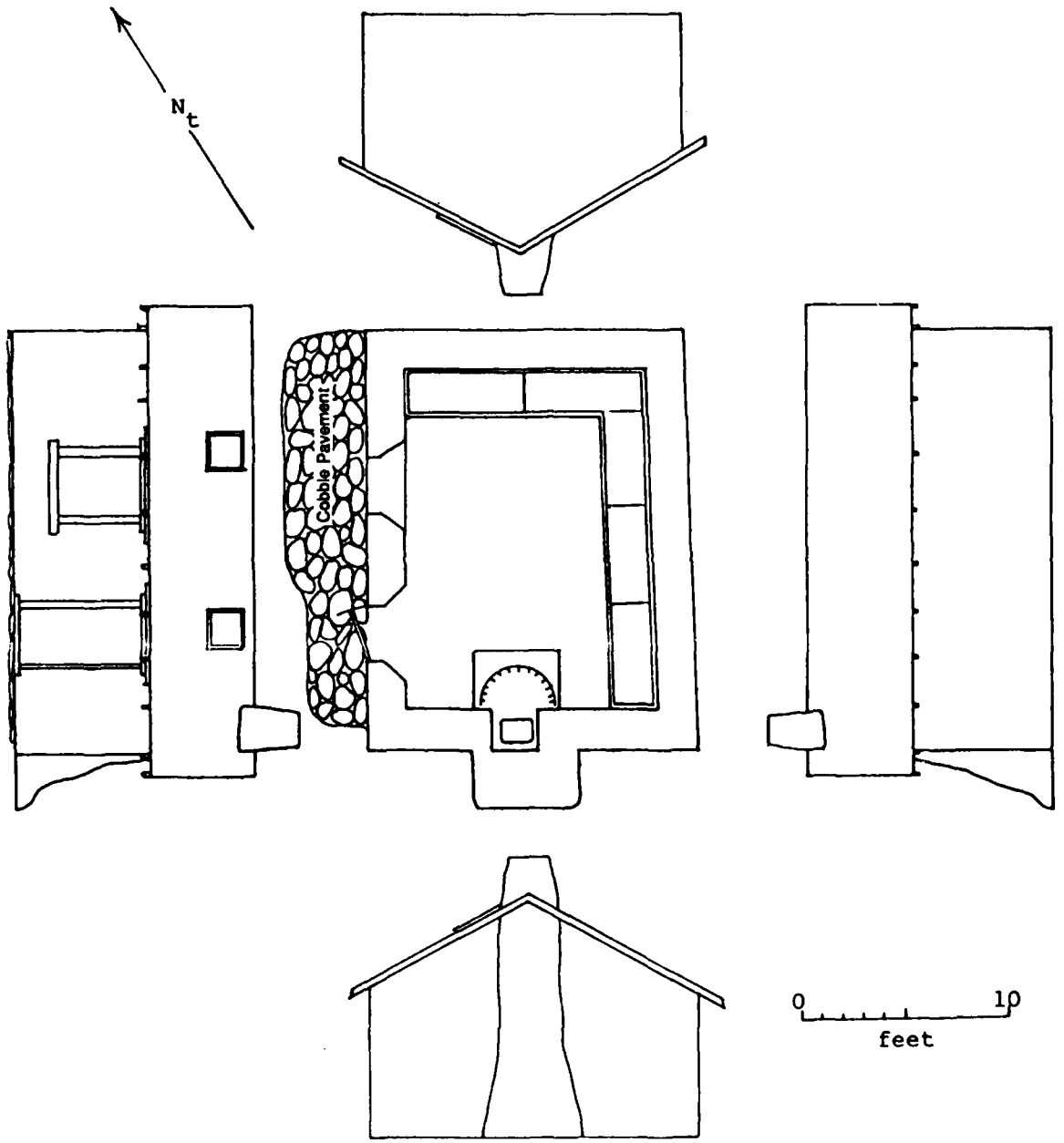
Our field visit confirmed the general condition and description of the three room cabin provided by WESTEC. The shed was found to be represented only by the remains of the floor framing; the only retrievable information consisted of the exterior plan dimensions. At the approximate location of the "water shed" we found a collapsed open framework for supporting a 15 x 60 inch cylindrical riveted steel water tank. Additional features observed and recorded include a cobble and

mortar barbecue and a "picnic" table constructed between two trees. Measured plan and elevation drawings of the three room cabin include reconstruction to original dimensions and features where possible.

The previously recorded location of this site was found to be in error and is corrected on the supplemental site record being prepared, which is to include the information above, measured drawings, and photographs.

CA-MNT-812H.—Examination of this stone cabin included the preparation of measured plan and elevation drawings. Fairly complete notes with the original site record allow comparison of features and construction details added at the time of the most recent restoration. The original record documented an interior coating of whitewash over a smooth wall and the use of peeled poles for rafters; a window seat was also noted. The interior currently shows bare rock with adobe mortar (cement mortar repairs in places) as if it had been cleaned by sandblasting or some other means to expose the rock. The window seat is no longer present. That wall is now bare and a storage locker/bench runs the entire length of the north and east walls. The roof is now supported by mill cut lumber and includes two skylights on the western side of the simple gable. The rafters are unevenly spaced, the average is 28.5 inches, and made of nominal 2 x 6 inch lumber with the exception that the rafters over the end walls of the structure are 2 x 8 inch lumber. Stringers are nominal 1x lumber on 7 inch centers. All observed nails are wire, suggesting that none of the original wood materials remain with the possible exception of a peeled pole set over the fireplace in lieu of a mantle. The gable ends appear (as noted in the original record) to have been either added or repaired at some point following initial construction.

Figure 6. CA-MNT-812H, Restored Stone Cabin.



Features added since the original recordation are restricted to two round "picnic" tables and a loose rock fire circle which was not previously noted. No concentrations of cultural debris were located. A thin scatter of materials occurs to the northwest of the cabin and includes small fragments of clear, sun-colored amethyst glass; this material was produced from ca 1880 to 1915 which indicates that the site was certainly occupied by ca 1920 and probably earlier. The cabin appears on a 1908 survey map, described as the Murphy stone cabin (WESTEC 1984:14). A Jeffrey pine noted during the WESTEC visit of 1983 appears to have been removed, leaving a stump.

The previously recorded location of this site was found to be in error and is corrected on the supplemental site record being prepared, which is to include the information above, measured drawings, and photographs.

CA-MNT-813H.—The appearance of this site is unaltered from the original site record description with the exception that it is more heavily overgrown with poison oak. Attempts to hand auger in the cobble filled soil were unsuccessful; instead, a shovel was used to explore for subsurface materials both within the structure and in the immediate vicinity. An examination of the surrounding vicinity was also made for cultural debris; no deposits of cultural materials were found.

The previously recorded location of this site was found to be in error and is corrected on the supplemental site record being prepared, which is to include the information above, measured drawings, and photographs.

CA-MNT-814H.—Our examination at this site location confirmed the report by WESTEC (1984:16) that the site is no longer discernable, apparently having been destroyed during the 1979-1980 construction of a large estate adjacent to the site. A supplemental site record is being prepared containing this information.

CA-MNT-1246H (H-1).—The field examination at this site confirmed the details of the 1983 WESTEC recordation.

> ...site presently consists of the remains of a 1930s wooden cabin constructed by Del Monte Properties Company in conjunction with their San Clemente Lake and Guest Ranch. The present remains include a standing stone-and-concrete chimney. Structural debris is scattered to the rear of the chimney, but no foundation remains. Metal plumbing debris, ceramics and glass, and recent target-shooting de-

> bris are scattered in the vicinity of the chimney. A barbecue pit of river cobbles, brick and concrete is located [up a slope] to the south of the structure at the end of a narrow roadway [WESTEC 1984:17].

A measured map of the site has been prepared for inclusion in the supplemental site record along with photographs taken during the field visit. A floor plan and rear elevation obtained during the archival research will also be added to the site record. A single hand auger hole was excavated in the previously noted trash scatter (approximately 6 m in diameter). Depth of the deposit at the auger location was approximately 45 cm; the materials observed were largely domestic in nature and dated ca 1930 through ca 1955.

CA-MNT-1247H (H-2).—The cabin at this site appears to be in much the same condition as described by WESTEC.

> ...this one-room lodge with a stone and concrete-mortar fireplace is of board-and-batton construction. Centered around the fireplace, the lodge is eight-sided [semi-circle, fireplace on long wall] with benches along the interior walls, with the exception of the fireplace wall. Other features associated with the rustic cabin include a three-hole outhouse to the south, a horse-hitching [sic] rail, and scattered debris [WESTEC 1984:18].

Measured plan and elevation drawings were made of the outhouse and cabin, and a measured map was prepared for inclusion in the supplemental site record. Additional information obtained in the field confirms use of the terrace south of the cabin for camping (i.e., loose rock fire rings, etc.).

CA-MNT-1248H (H-3).—This site consists of the current San Clemente Dam and associated structures (including the remains of the San Clemente Guest Ranch).

> ...the complex of buildings once comprising the San Clemente Guest Ranch have recently been razed and bulldozed (1981). The only remains at the complex consist of the dam itself; the white, wood-frame damkeeper's cottage and associated sheds; numerous concrete foundations; a stone cold storage shed; the barbecue/picnic area; and stone walkways and gardens which once surrounded the structures.

A trash scatter was located near the north east extent of the site on the steep slope between the access road and the Carmel River. Materials observed are largely domestic in nature and date ca late 1930s and later, including recent ma-

terials. This scatter does not appear to represent a viable archaeological deposit. A dump site associated with the Guest Ranch is implied by a reference on the Company's 1930 plot map stating "road to dump." The incomplete information on the map suggests that the dump site is outside of the proposed reservoir area (above 680 feet elevation); it was not located during our investigation.

The Guest Ranch area has been mapped and is described fully in the supplemental site record being prepared as a part of this project, reproductions of early maps are also being incorporated into the site record. The dam is discussed within the historical investigations section, reproductions of portions of the documenting maps are included with that discussion.

CA-MNT-1249H (H-4).—The condition and description of the Carmel Dam provided by WESTEC (1984) remains valid. A close examination of the surrounding vicinity failed to locate the remains of any work camps, or any other cultural features that would have been associated with the original construction (see also CA-MNT-1250H). Augering was difficult and unproductive in the gravel and cobble filled soils in the vicinity of the dam. Although not directly comparable, the author's experience with dam sites in the Sierra Nevada mountains suggests that any work camps may well have been upstream of the dam site and quite possibly silted over as well as inundated. A supplemental site record is being prepared to include this information and photographs. A photograph appears within the historical investigation section.

CA-MNT-1250H (H-5).—Our visit to this site confirmed the WESTEC (1984) observations that the site was most likely destroyed by construction of the access road. Slightly downstream on the east side of the road we located an old steep road cut leading to an apparent rock quarry which may have been associated with one of the dams during their construction. Another feature, found "on-site" is a single cable crossing the river with an associated trolly car. This feature is currently deteriorating but appears to be too recent to have been associated with the cabin site. It appears more likely to have been used during the active period of the Guest Ranch or other operations of that period. A supplemental site record is being prepared to incorporate this information.

CA-MNT-1251H (H-6)—This site is most easily approached by a trail which follows a drainage a short distance to the north. The trail must have been well used

at some time but is now discontinuous. The site is largely as described by WEST-EC (1984). Close examination failed to disclose very many architectural details. Those discerned are: Apparent post foundation, wood construction using variable width 1x lumber in a vertical board and batton configuration with either a shed or gable roof. The original structure was secured with machine cut nails (suggesting occupation by ca 1900); however, reused lumber and repairs/additions demonstrate considerable use of wire nails (indicative of continued occupation post-ca 1900). Three test holes excavated with a hand trowel revealed a low level of cultural debris at the cabin site, both within and outside the apparent area of the structure. A careful examination of the surrounding vicinity failed to locate any deposits of cultural material or related features. A supplemental site record is being prepared to incorporate this information, a measured site map, and photographs.

CA-MNT-1252H (H-7).—During our field investigation we revisited the mapped location for the "Feliz cabins" and found evidence of two structures, a minimal, widely scattered selection of artifacts, a road-cut, and an old fence line. One of the structures was of wood construction, apparently on a post foundation, with a shed or gable roof, and constructed with wire nails (suggesting construction post-1890s). Dimensional data could not be recovered from the materials observed, however, this appears to have been a small structure. The other structure, some 41 m downslope, is represented by a corner foundation of loose-laid stones, a couple of board fragments, and a conglomeration of ferrous metal upholstery springs. No further architectural details were discernable. A supplemental site record is being prepared including this information, a measured site map, and photographs.

CA-MNT-1253 (BRM-1).—During the relocation of this single earthbound mortar rock a second earthbound mortar rock was located at a distance of approximately 50 m. Auger borings were not possible at this site due to the cobble filled soil. Instead, small excavations were made with a hand trowel to a depth of approximately 30 cm to determine the possible presence of subsurface cultural materials. None were found, nor were any surface indicators of cultural use observed during a close examination of the immediate vicinity (with the exception of the mortar rocks). The second rock has been incorporated into the site record and both are described and depicted in measured drawings. A measured map and

photographs are also being included in the supplemental site record being prepared as a part of this project.

APPLICATION OF CRITERIA FOR NATIONAL REGISTER SIGNIFICANCE TO THE PROJECT AREA SITES

Significance may be based on several different sets of criteria. With resources on Federal lands or Federally funded projects, however, the primary criteria used for evaluation of significance are those established for the National Register of Historic Places. They are as follows:

> The quality of significance in American history, architecture, archaeology, engineering and culture is present in districts, sites, buildings, structures, and objects of State and local importance that possess integrity of location, design, setting, materials, workmanship, feeling and association and:
>
> > (1) That are associated with events that have made a significant contribution to the broad patterns of our history; or
> >
> > (2) That are associated with the lives of persons significant in our past; or
> >
> > (3) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
> >
> > (4) That have yielded, or may be likely to yield, information important in prehistory or history [36 CFR 60.6].

Clarification of these criteria is presented in a pamphlet published by the U.S. Government Printing Office:

> Ordinarily cemeteries, birthplaces, or graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historical buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 50 years shall not be considered eligible for the National Register [U.S. Government Printing Office 1983].

The same pamphlet includes a series of exceptions to this policy, but these are limited to special circumstances which do not apply to the cultural resources within the San Clemente Dam area.

King, Hickman, and Berg further interpret the quality of significance in terms of the property's utility in interpreting the past:

> ...To meet the criteria, the property must arguably have at least a potential role to play in maintaining the integrity of a community or neighborhood, in the maintenance of some group's sense of place and cultural value, or in the enhancement of human knowledge. A property lacks significance when it has no utility at all or when its role is already played by some other entity [King et al. 1977:96].

Using these criteria, the following evaluations have been drawn for identified project area sites:

CA-MNT-587.—Field investigation failed to locate one of the two earthbound mortar rocks reported as part of this site. No other cultural materials were located in association with the mortars. This site does not appear to meet any of the criteria for National Register nomination and no further recommendations are made.

CA-MNT-811H.—Intensive archival research brought no additional information to light on the construction and use of this cottage. Field examination confirmed earlier evaluations of a circa 1930s wood frame building on 2 x 6 inch redwood post foundations placed directly in the soil. Debris scatters to the east and south of the collapsed structure included two galvanized sheet metal water tanks of approximately 60 and 30 gallons capacity, a kerosene kitchen stove embossed "New Perfecta 303, Made in U.S.A.", and a stone barbecue pit.

The period of use of this cottage appears to post-date the period of National Register significance criteria, defined as 50 years before the present date. Company use of the structure has been documented in interviews conducted by WESTEC project historians. No recommendation is made for nomination of this site to the National Register.

CA-MNT-812H.—Intensive archival research identified this structure of mortared, dressed stone as most likely associated with John and Ann Murphy, residents and property claimants in 1883, to whom a government patent to the

public lands including the stone cabin site was granted in 1890. Although the stonemason who built the cabin is still not identified, and could have been John Murphy, the building generally represents a type of construction peculiar in Monterey County to the Upper Carmel Valley. The possibility remains that the builder was a member of a cultural group who brought the art of stoneworking to the Upper Carmel Valley as an immigrant, and was responsible for disseminating the form in the area. In addition to its vernacular architectural significance, the site represents local applications and manipulation of United States public land laws regarding homesteading and preemption claims. Further research into population census, voter registration, and tax assessor's records, in addition to review of the General Land Office Preemption records (not available to researchers during these investigations) can be expected to provide additional interpretation for this site. The site is recommended for nomination to National Register status at the local level of significance in the categories of exploration/settlement and possibly architecture. Review of photographs and records of restoration work completed by the owners will be necessary to determine the degree of architectural integrity retained by the restored structure. Although a small amount of scattered debris dating to the ca 1880-1915 period was located in association with the cabin, no archaeologically significant deposits were identified.

CA-MNT-813H.—Although no additional information was developed about this site, its significance in the settlement history of the County may be interpreted in the same manner as that of CA-MNT-812H. As no information could be located about "the Frenchman Jeanine" who is associated with the site in local oral traditions, it is presumed that the resident/builder occupied the lands as a squatter. Additional archival research as recommended for National Register application for CA-MNT-812H applies to this site as well, as does a recommendation for nomination for National Register status at the local level of significance in exploration/settlement. No deposits of archaeologically significant materials were located during the field examination of this site; however, ground cover and duff were generally dense and such deposits could have been missed.

CA-MNT-1246H.—Intensive archival research has indicated that the period of use of this structure post-dates the period of National Register significance. Plans and drawings of the structure exist in Pebble Beach Company files as the Sleepy

Hollow Cabin. Although a deposit of cultural materials is documented at this site, our examination suggests that the archaeological significance of the deposit is minimal. No recommendation is made for nomination of this site to the National Register.

CA-MNT-1247H.—No further information was developed about this site during our investigation. WESTEC historians have placed the period of use as post-dating the period of National Register significance, and conducted numerous interviews documenting its recent use. No recommendation is made for nomination of this site to the National Register.

CA-MNT-1248H (H-3).—Intensive archival research has indicated that the San Clemente Dam very likely represents one of the first applications in the nation of an engineering principal of horizontal arch action and vertical beam action in arch load formulas defined by F. A. Noetzli in 1920, which revolutionized concrete arch dam construction. It is recommended that the dam be recorded by members of the Historic American Engineering Record, and that additional National Register application research be undertaken to place the dam more precisely in the context of engineering history and applications. The site of the dam is recommended for nomination to the National Register at the national level of significance in the category of engineering.

The adjoining San Clemente Dude Ranch, included as a part of site CA-MNT-1248H, has been thoroughly documented in Pebble Beach Company records with plans, topographic maps, and drawings. A scattered deposit of materials was discovered flowing down the bank near the northeast corner of the complex; however, examination suggests that the deposit is not archaeologically significant. No National Register recommendation is made for this portion of the site, pending recommendations to the contrary by the State Historic Preservation Office should the context of the dam and recreation site complex be considered equally significant.

CA-MNT-1249H (H-4).—Intensive archival research has determined that the original masonry Carmel Dam was constructed in 1883-1884, with enlargements and improvements in 1891-1892. The complete dam with gates and fishway is extant. It is believed that the dam may represent one of the last applications in the United States of this type of gravity dam, completed during the period when con-

crete arch dams emerged as the safest and most economical type of construction. The availability of contracted Chinese labor for non-mechanized construction in the remote area may have been the critical factor in selecting this type of construction in view of the emergence of concrete arch dams at the same time. The dam was a major undertaking of the Pacific Improvement Company, and directly affected growth, development and economics on the Monterey Peninsula for a period of 36 years. The dam is recommended for nomination to the National Register at the State level of significance in the category of engineering, social history, and economics. It is further recommended that the dam be recorded by members of the Historic American Engineering Record, and that additional research be undertaken to more precisely place the dam in the historical context of masonry gravity dam technology.

CA-MNT-1250H (H-5).—The WESTEC (1984) assessment of this site as having been destroyed was confirmed by our field examination. The site is not eligible for nomination to the National Register and no further recommendations are made.

CA-MNT-1251H (H-6).—Intensive archival research has indicated that this site was not legally associated with John and Ann Murphy as previously thought, but was purchased for the Pacific Improvement Company from unclaimed public lands by a company employee, Lott Norton. However, since it has been traditionally known as "Murphy's Frame Cabin", it may have been constructed and occupied by the Murphys under preemption procedures or practices by 1883 or earlier. Settlement and social history research recommended for CA-MNT-812H and CA-MNT-813H above apply to this site as well; however, any recommendation for National Register nomination is dependent on the integrity of the archaeological resources extant. The field investigation did not locate any significant archaeological deposits on site or in the immediate vicinity of the meager cabin remains. Therefore, no recommendation is made for nomination of this site to the National Register.

CA-MNT-1252H (H-7).—During the field investigation this site was located; it consists of the minimal remains of two wood structures, a road cut, portions of a barb wire fence, and a minimal scatter of debris. We estimate that a majority, if not all, of the archaeological data contained in the remains observed has been recorded for inclusion in the supplemental site record being prepared as a part of

this investigation. The site does not appear to be eligible for nomination to the National Register and no further recommendations are made for this site.

CA-MNT-1253 (BRM-1).—Although a second earthbound mortar rock was located during our field investigation, no cultural materials were found in association with either rock or in the general area. The site does not appear to be eligible for nomination to the National Register and no further recommendations are made.

SUMMARY

Archival research and field investigations reported herein have resulted in recommendations for the nomination of four sites to the National Register of Historic Places. These recommendations include the existing San Clemente Dam (CA-MNT-1248H) and the earlier Carmel Dam (CA-MNT-1249H), as well as two stone cabins (CA-MNT-812H and -813H). The other sites examined do not appear to be eligible for nomination to the National Register at this time. A summary of the findings is included in Table 1.

Table 1. Summary of Findings.

Site	Eligible for Nomination	Significance			Comment
		National	State	Local	
CA-MNT-587	No				
CA-MNT-811H	No				
CA-MNT-812H	Yes			X	Exploration/settlement, architecture
CA-MNT-813H	Yes			X	Exploration/settlement, architecture
CA-MNT-814H	No				
CA-MNT-1246H	No				
CA-MNT-1247H	No				
CA-MNT-1248H	Yes	X			Engineering
CA-MNT-1249H	Yes	X			Engineering
CA-MNT-1250H	No				
CA-MNT-1251H	No				
CA-MNT-1252H	No				
CA-MNT-1253	No				

Summary of Recommendations

The recommendations, presented on pages 35-38, are summarized in the following section:

CA-MNT-812H.—Further research into population census, voter registration, and tax assessor's records, in addition to review of the General Land Office Pre-emption records (not available during these investigations) can be expected to provide additional interpretation for this site. Review of photographs and records of restoration work completed by the owners will be necessary to determine the degree of architectural integrity retained by the restored structure.

CA-MNT-813H.—Same as for CA-MNT-812H, above.

CA-MNT-1248H.—It is recommended that the dam be recorded by members of the Historic American Engineering Record, and that additional research be undertaken to place the dam more precisely in the context of engineering history and applications.

CA-MNT-1249H.—It is recommended that the dam be recorded by members of the Historic American Engineering Record, and that additional research be undertaken to more precisely place the dam in the historical context of masonry gravity dam technology.

REFERENCES CITED

American Society of Mechanical Engineers
1920 *The Engineering Index.* American Society of Mechanical Engineers, New York.

Army Map Service
1947 Jamesburg, Monterey County, 15 minute quadrangle. War Department, Washington, D. C.

Baum, F. G. and Company
n.d. *New Type of Dam.* F. G. Baum and Company, San Francisco.

Board of Managers, American Engineering Society
1892 *Descriptive Index of Current Engineering Literature, Volume 1, 1884-1891.* Association of Engineering Societies, Chicago.

Breschini, G. S.
1987 Research Design for Archeological and Historical Investigations for the San Clemente Dam EIR/EIS, Carmel Valley, Monterey County, California. Submitted to Monterey Peninsula Water Management District, Monterey.

Breschini, G. S., T. Haversat, and J. Erlandson
1986 *California Radiocarbon Dates,* Fourth Edition. Coyote Press, Salinas.

Carmel Pine Cone
Newspaper Microfilm Collection, Harrison Memorial Library, Carmel:
1919 "How Will it Affect Carmel?" March 6.
1919 Water Works, May 1.
1920 "Monterey County Water Works," May 6.
1920 "Our Water Supply," December 9.
1920 "Hunting Lodge on the Carmel River," December 16.
1945 Carmel Valley Dam, February 3.

De Voe, Marcia
1979 *The Martins and the Hattons.* Privately published, Carmel.

Edwards, R. L., P. P. Hickman, and G. S. Breschini
1974 Assessment of the Impact on the Cultural Resources of the Proposed San Clemente Dam, Upper Carmel Valley, Monterey County, California. Submitted to U.S. Army Corps of Engineers, San Francisco.

Elliott and Moore, Publishers
1881 *History of Monterey County, California.* Elliott and Moore, San Francisco.

Fink, Augusta
1972 *Monterey County: The Dramatic Story of its Past.* Valley Publishers, Fresno.

Galloupe, Francis E., M. E.
1888 *Index to Engineering Periodicals 1883-1887.* Engineering News Publishing Company, New York.

Harding, S. T., and Loran S. Bunte, Jr.
1957 Water Supply of Monterey County and Plan for Its Use, with Supporting Material. Report prepared for Monterey County Flood Control, Salinas.

Harrison Memorial Library Local History Collection, Carmel
Nixon Vertical Files.
Newspaper Microfilms.

Hawley, George W.
1932 *Principles and Methods Pertaining to the Design and Construction of Arch Dams.* State of California Department of Public Works, Sacramento.

Koploy, Shirley
1980 "Are We Ready for the Next Drought?" *Monterey Life*, October:51. Harrison Memorial Library Nixon File, clipping.

Lydon, Sandy
1985 *Chinese Gold: The Chinese in the Monterey Bay Region.* Capitola Book Company, Capitola.

McClure, S.
1966 Records of the Pacific Improvement Company. Ms. on file, Graduate School of Business Jackson Library, Stanford University.

Monterey County Office of the Recorder
Deeds
Patents
Homesteads
Index to Probate
Maps - Official Surveys
Preemptions Claims

Noetzli, F. A.
1920 The Reinforced Concrete Arch Dam. *Journal of Electricity* 45(2), March-April.

Pacific Improvement Company Collection

Unpublished documents in the Department of Special Collections, Stanford University Greene Library:

JL 17, Box 1 Folder 2: Certificate of Incorporation, Pacific Improvement Company.

JL 17, Box 19 Folder 2: Old Deeds.

JL 17, Box 19 Folder 3: Old Deeds.

JL 17, Box 19 Folder 10: Original Cost of Monterey County Water Works.

JL 17, Box 21 Folder 6: Notice of Incorporation, Del Monte Properties Company. Folder 8: Miscellaneous memos.

Jl 17, Box 21 Folder 14: Reports on Hydro-electric Power Plant at San Clemente Dam, by J.A. Wilcox, 1923.

JL 17, Box 22 Folder 30: Report of the Power, Irrigation and Domestic Water Supply Possibilities of the Carmel River, Monterey County, California, by J.A. Wilcox, January 19, 1918.

JL 17, Box 25 Folder 13: Monterey County Water Works estimated summary of revenues and disbursements.

JL 17, Box 35 Folder 6: Report of the Railroad Commission of California.

JL 17, Box 99 Folder 1: Collections Records, Operating Expenses, Monterey County Water Works.

Pebble Beach Company

n.d.a Map K-3: Old Working Sheet T 17 S, R 2 E MDM.

n.d.b Map K-6: Plans and Estimates, New Buildings San Clemente Dam.

1908 Map K-78: Survey of Carmel River above Dam, W.T. Moore, April 22.

1919a Map K-1 (a): Map Showing Property of Pacific Improvement Company.

1919b Map K-1 (c): Map Showing Property of Pacific Improvement Company, with corrections.

1920a Map K-1 (b): Map Showing Property of Del Monte Properties Co.

1920b Map K-74: San Clemente Reservoir Topo (triangulations, 1920).

1921a Map K-114: Plan of the Proposed Fishway for San Clemente Dam, by William T. Moore.

1921b Map K-115: Data Sheets of the San Clemente Dam, drawn by D. Howard, January 28.

1928a Map K-60: Los Tularcitos-San Clemente-Cachagua Area Assessors Map, December.

1928b Map K-64: Map Showing Properties of Del Monte Property Company in Carmel Valley and Cachagua Valley, March.

1929 Map K-94: Map Showing Subdivision of, and Owners in Carmel and Cachagua Valleys and Vicinity, March.

1930a Map K-5: Buildings at San Clemente Dam, drawn by Carey.

1930b Map K-7: Plans, Dude Ranch Guest House.

1937a Map K-9: Additions to Sleepy Hollow Cabin, May.

1937b Miscellaneous Maps: 24" Welded Steel Pipe in Carmel Valley. Drawn by Irving Hess, Engineer, October.

1945 Map K-106: Topography of San Clemente Dam Lodge, November.

Robinson, William Wilcox
1848 *Land in California.* University of California Press, Berkeley.

Sheeders, D. J.
1987 Letter dated January 16, 1987, to Henrietta Stern of the Monterey Peninsula Water Management District. Ms. on file, Monterey Peninsula Water Management District, Monterey.

United States Army Corps of Engineers
1977 Carmel River, Monterey County, California, Progress Report for Water Resources Development. U.S. Army Corps of Engineers, San Francisco.

United States Department of Transportation
1977 *Historic and Archaeological Preservation.* Federal Highway Administration, Washington, D.C.

United States Geological Survey
1921 Jamesburg, Monterey County, 15 minute quadrangle.
1933 Department of the Interior, Washington, D.C.
1939
1940

United States Surveyor General
1883 Township 17 South, Range 3 East, MDM. General Land Office, Washington, D.C.
1884 Township 17 South, Range 2 East, MDM. General Land Office, Washington, D.C.

WESTEC Services, Inc.
1984 Cultural Resources Survey, San Clemente Dam Enlargement, Upper Carmel Valley, Monterey County, California. Submitted to Monterey Peninsula Water Management District, Monterey.

END

11-87

DTIC